AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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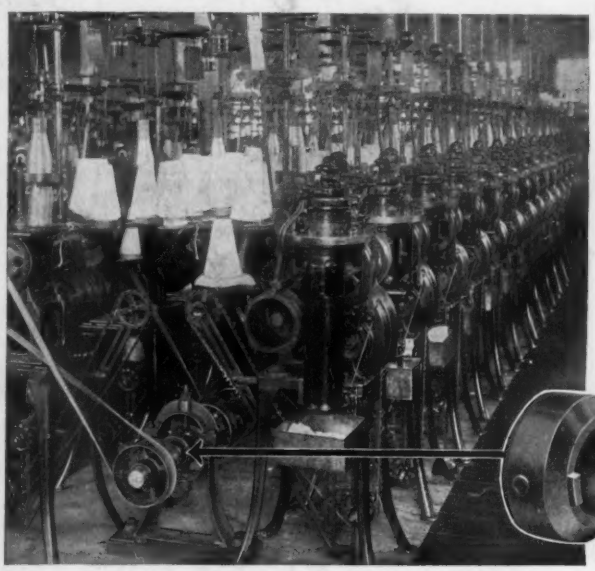
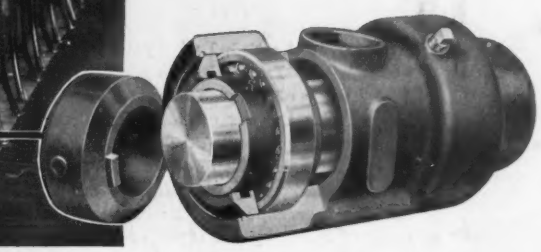


FAFNIR

One Motor Does The Work Of Two



Way back in 1822, two enterprising young Englishmen, Benjamin Fewkes and George Warner by name, moved to Ipswich with their elementary knitting machines and founded the hosiery industry in this country.

One hundred years later the Ipswich Mills —now grown to be one of the largest and most up-to-date hosiery concerns in the world— equipped their knitting machine drives with *Fafnir Double Ball Bearing Hanger Boxes.*

In this way they now operate a group of machines with a single five horsepower motor, whereas two were required before installing *Fafnir Boxes.*

Fafnir Boxes will save power for you too, either on your line shafting or machine drives.

Tourists and others passing through Ipswich will find it interesting to visit the Tea Room and see the exhibits of hosiery and relics of historical interest.

All standard types and sizes.

THE FAFNIR BEARING COMPANY

New Britian, Conn.

Southern Representatives

O. R. S. POOL,
220 Vail Ave., Charlotte, N. C.

A. G. LAUGHRIDGE
P. O. Box 1847, Atlanta, Ga.

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Going or Coming?

ARE YOU satisfied with your business when you open your morning mail? Do the letters you read make you see your customers as an army of staunch supporters, continually facing in your direction, having faith in your contracts, sending you more business and now and then turning new customers your way?

Or is your mail full of letters from customers complaining about your failure to make promised deliveries, criticizing uneven dyeing in your cloth, refusing to accept an order because your dyer has failed to obtain the required brilliancy or the proper shade of color?

Do your customers and ex-customers look to you like an army of "knockers"? Is the line gradually thinning? Are they turning away from you instead of toward you?

To get customers and hold them you must have an organization you can depend on, one that can do the unusual when called upon. You must be able to depend upon those outside of your company who serve you as well as those inside,— your yarn dyers for instance.

Our usual deliveries are from ten days to two weeks. When the occasion has demanded we have reduced this time to two or three days.

If you arrange to keep a surplus stock of gray yarn in our plant we can regularly make substantial shipments on your dyeing orders in less than a week's time. We can furnish this yarn for you if you so specify.

The yarn is dyed in wound form on Franklin springs. You can do the winding or we will. When it is shipped back to you there are no long chain warps to beam. Franklin packages will fit in the V creel for beaming.

Thus Franklin dyeing not only saves you time but also money.

Are your customers coming or going? Send your next order to us and stop worrying about the delivery question.

FRANKLIN PROCESS COMPANY

Yarn Dyers · Yarn Merchants · Mfrs Glazed Yarns Dyeing Machines

Philadelphia · PROVIDENCE · Manchester, Eng.

New York Office 72 Leonard St.

SOUTHERN FRANKLIN PROCESS COMPANY

Greenville, S. C.

Reducing the Cost of Labor

The Possibilities of the Northrop Automatic Loom in the way of reducing Cost of Labor are not fully appreciated throughout the trade. Co-operation between our service men and the mills has brought some remarkable results in this direction the past two years.

Let's Talk It Over. We may have a story of special pertinence to you and your mill.

DRAPER CORPORATION

Southern Office Atlanta Georgia Hopedale Massachusetts

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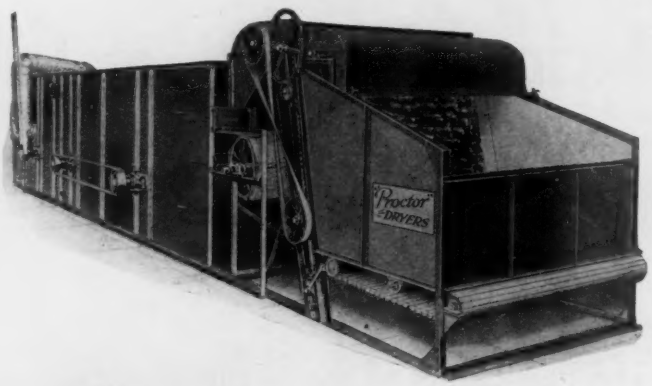
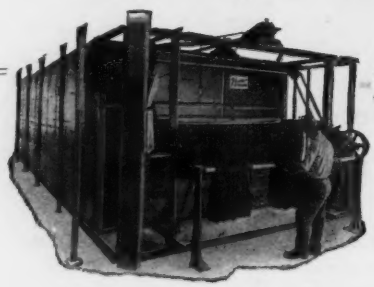
DRYING MACHINERY

TYPES FOR ALL TEXTILE RAW MATERIALS AND PRODUCTS



"Proctor" Automatic Dryer for Bleached and Dyed Cotton, Linters and other Raw Stock.



"Proctor" Automatic Skein Yarn Dryer

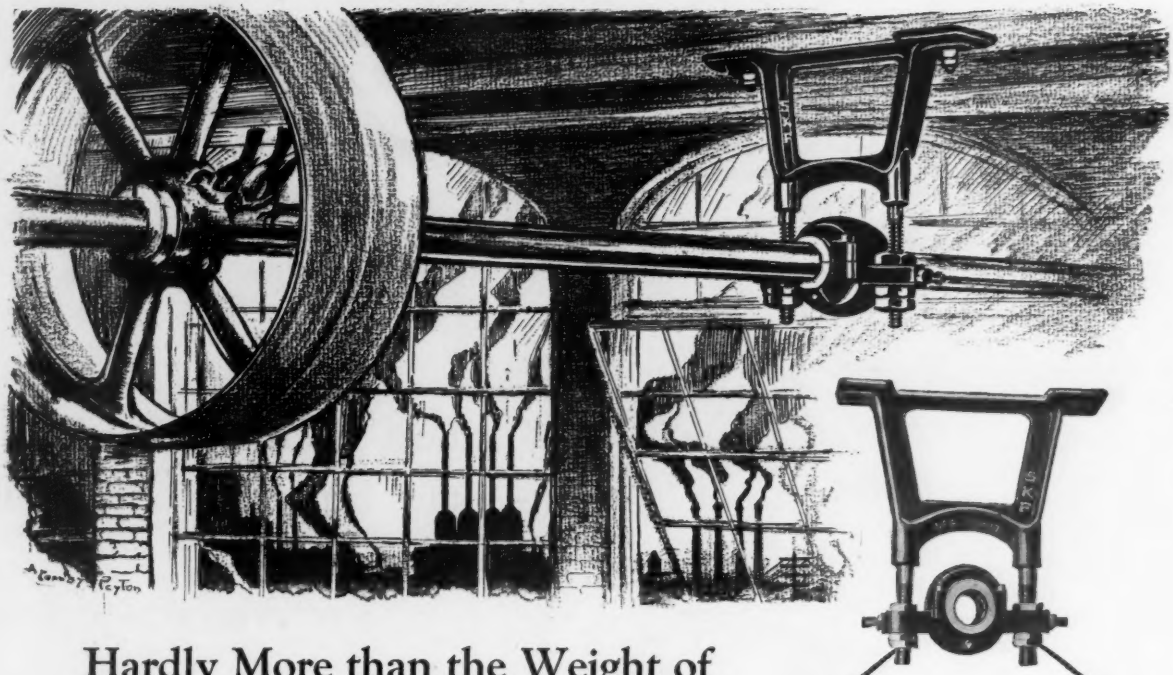
IN the many different types and applications of "Proctor" Dryers, you are sure to find the most satisfactory means of drying any textile raw stock, yarn or fabric—at new low limits of cost.

There are Single Conveyor and Three Conveyor types of "Proctor" Dryers for raw stock; Truck and Automatic Dryers for skein yarns; Tray Dryers for package yarns; Automatic Loop Dryers for piece goods; Housing and Air Circulation Systems for cotton and woolen goods tenters; Automatic Boarding Machines for hosiery; Carbonizing Dryers for wool stock, rags and cloth.

Often, very unusual drying requirements are mastered in modification of standard types of "Proctor" Dryers, or in new designs. In any problem of drying, you can make good use of our unequalled experience—an experience of 40 years, specializing in drying machinery.

PROCTOR & SCHWARTZ, INC.

Formerly
THE PHILADELPHIA TEXTILE MACHINERY CO.
SMITH & FURBUSH MACHINE COMPANY
PHILADELPHIA, PA.



Hardly More than the Weight of Your Thumb—Two Sparrows Turn 50 ft. of Shafting

JUST an active, self-reliant little body in a fluff of brownish feathers—hardly as heavy as your thumb. Yet, down in Texas, two of these inquisitive little birds flew through a factory window, lighted on a pulley—and turned fifty feet of shafting.

Imagine what you would gain if your shafting turned as easily. Others have found that Skayef self-aligning ball bearing hangers save 15 to 35% in power costs, reduce maintenance and lubrication 60 to 80% and eliminate expensive shutdowns for adjustments and replacements. And of course these savings soon pay for a changeover—generally in less than two years.

Stop friction's theft of a large portion of your profits by letting our engineers submit plans for a changeover.

For Nearest Distributor See MacRae's Blue Book

1083

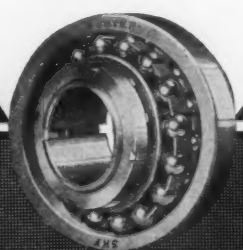
SKAYEF
—the 4-Saving Hanger

1st Saving Skayef Hangers save from 50 per cent upward of the energy which plain bearings consume in friction. This means a saving of 15 to 35 per cent of your power cost.

2nd Saving Considerable time is saved by eliminating shutdowns for replacing or adjusting bearings; forced idleness of machines and men is a cost-factor too big to be ignored.

3rd Saving Lubricant consumption reduced 60 to 80 per cent as compared with plain bearing hangers. Lubricant required only at infrequent intervals and it cannot leak out and ruin belts or product.

4th Saving There is no discernible wear of the hard steel balls and races and absolutely no shaft wear. Dust and grit cannot enter the bearings and Skayef self-aligning ball-bearings have the exclusive inherent ability of compensating automatically for shaft deflections.



SKAYEF
Self-Aligning Ball-Bearing
HANGERS

Made Under
SKF
Supervision

THE SKAYEF BALL BEARING COMPANY - - - - 165 Broadway, New York City

The Wood Box

1. Reduces Shipping Costs
2. Creates Customer Good-Will
3. The Best Damage Protection Insurance

MANUFACTURERS of textile products, as well as all other manufacturers of today, realize the valuable asset in the good-will of their customers and that any part of their service that is causing dissatisfaction to the customer means a tangible loss in dollars and cents.

The question of shipping containers is one of importance to the textile manufacturer—it is a question of getting your product to the customer in the best possible condition thereby gaining good will for the product and yourself—and it is also a question of saving yourself loss from damage to shipments.

It is significant to note that industry in general is selecting shipping containers that afford the greatest damage protection and are demanding WOOD BOXES. But some shippers are using boxes that are too light, which makes the box liable to break open—others use boxes too heavy which unnecessarily increase freight charges.

Are your goods getting maximum protection at minimum cost? Is your packing expense too great?

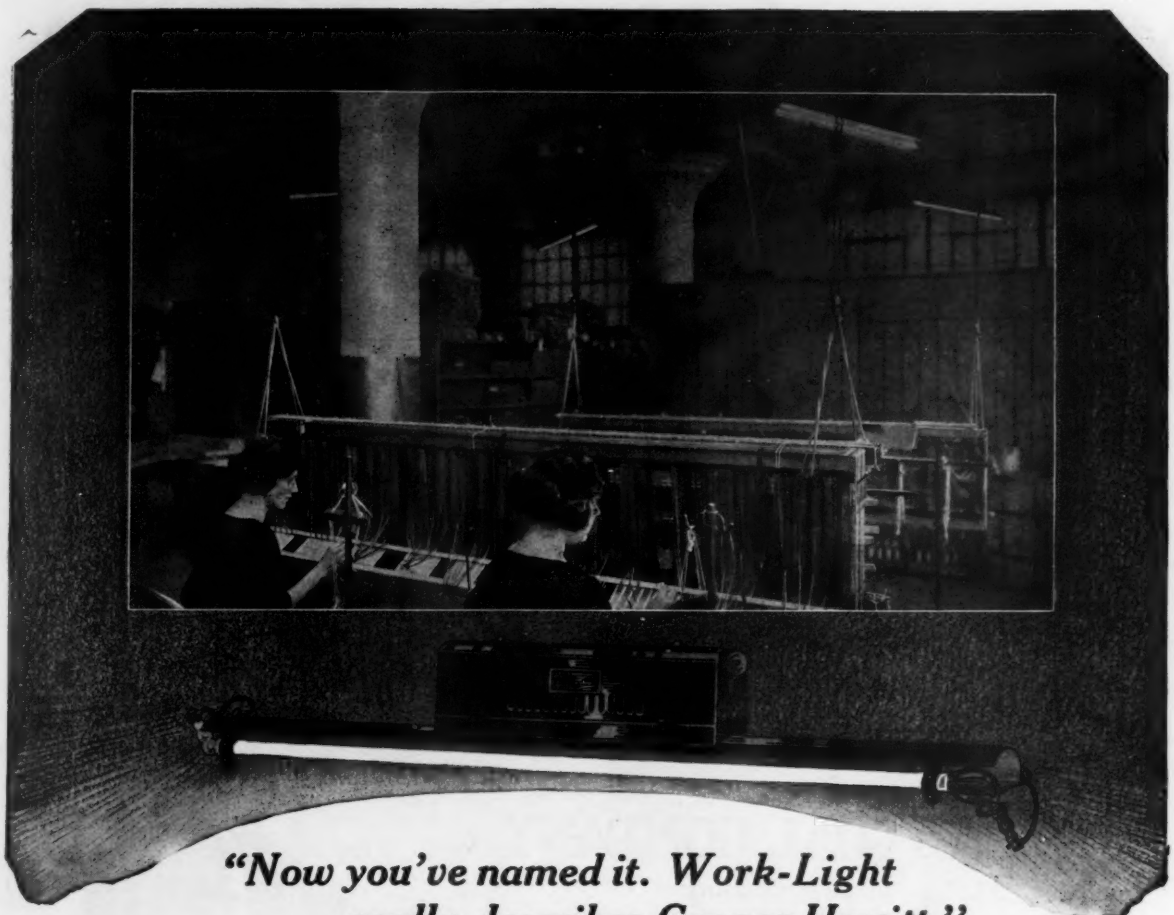
HIGHTOWER Wooden Packing Cases have been found the most all-around satisfactory and economical shipping containers possible. The interlocking reinforcement feature makes it possible to use lighter-weight material and the case will carry heavier materials and is harder to pilfer, or break open than others.

Give us the details of your shipments and we will tell you the most economical and satisfactory way of shipping your products.

Hightower Box & Tank Company

ATLANTA, GA. BIRMINGHAM, ALA.

HIGHTOWER
Wooden Packing Cases



"Now you've named it. Work-Light really describes Cooper Hewitt."

The illustration shows a night view under Work-Light in the Steel Heddle Manufacturing Co. plant, Philadelphia. This famous firm has an installation of 200 Work-Light Lamps.

THAT'S what one manufacturer told a salesman the first time he heard the new name for Cooper Hewitt light. He has been a user since 1908.

"Your light is different, in a way that counts in our work," he went on. "It has been our work-light for sixteen years and that's certainly its logical name."

To a man cutting a gear, milling a shaft, gauging a bearing—or running a press, lathe, knitter or loom—a difference in light can be actually felt. Light containing no red rays, diffused from a fifty-inch source, makes the kind of difference that helps.

It is light free from the glare and the heavy black shadows which workmen instinctively fight. No heat, no weariness, such as red rays cause. That is Work-Light. It can be called by no other name.

Time is the one thing common to every man and every plant. So many hours in every day—no more, no less. But if one plant can make the night-time hours as productive as daytime hours, it's as though extra hours had been added to the twenty-four. Time can not be stretched, but *work done in work hours* can be increased with Work-Light.

Naturally, plant records will show it. Production flexibility is a real factor in profit under competitive conditions today. Plants in all fields of industry offer cases in point.

There's a story for you in specialized industrial light. Write for the Work-Light booklet today. Cooper Hewitt Electric Co., Hoboken, N. J.

89 River Street

COOPER HEWITT

Work-Light

14 © C. H. E. Co. 1924

Your Dollars and Our Coal

What you actually pay for coal has little to do with its *cost.* Your dollar may purchase 1000 lbs. or 2000 lbs. of coal, but the actual worth of the coal is represented in "value received" from the steam or heat it produces.

Every dollar spent for General Coal Company's coal is an investment that yields a substantial profit expressed in *an increase of B. T. U.'s per pound.*

More *coal* to the ton, more *heat* to the ton, *less* tons per year—that is the formula for boiler-room efficiency.

Trade *your* dollars for *our* coal, and watch the net profits of your business increase.

Further information regarding the proper coal for every purpose will gladly be forwarded from our nearest office on request.

Admiralty Coal — STONEGA — RODA — DEPENDABLE COAL

GENERAL COAL COMPANY

1727 Land Title Building

BUNKER COAL

Supplied at

Baltimore, Md.
Charleston, S. C.
Jacksonville, Fla.
Norfolk, Va.
Savannah, Ga.

PHILADELPHIA

EXCLUSIVE SALES AGENT
—FOR—
STONEGA COKE AND COAL CO.
HAZLE BROOK COAL CO.
—AND—
SUCCESSORS TO BUSINESS OF
WENTZ COMPANY

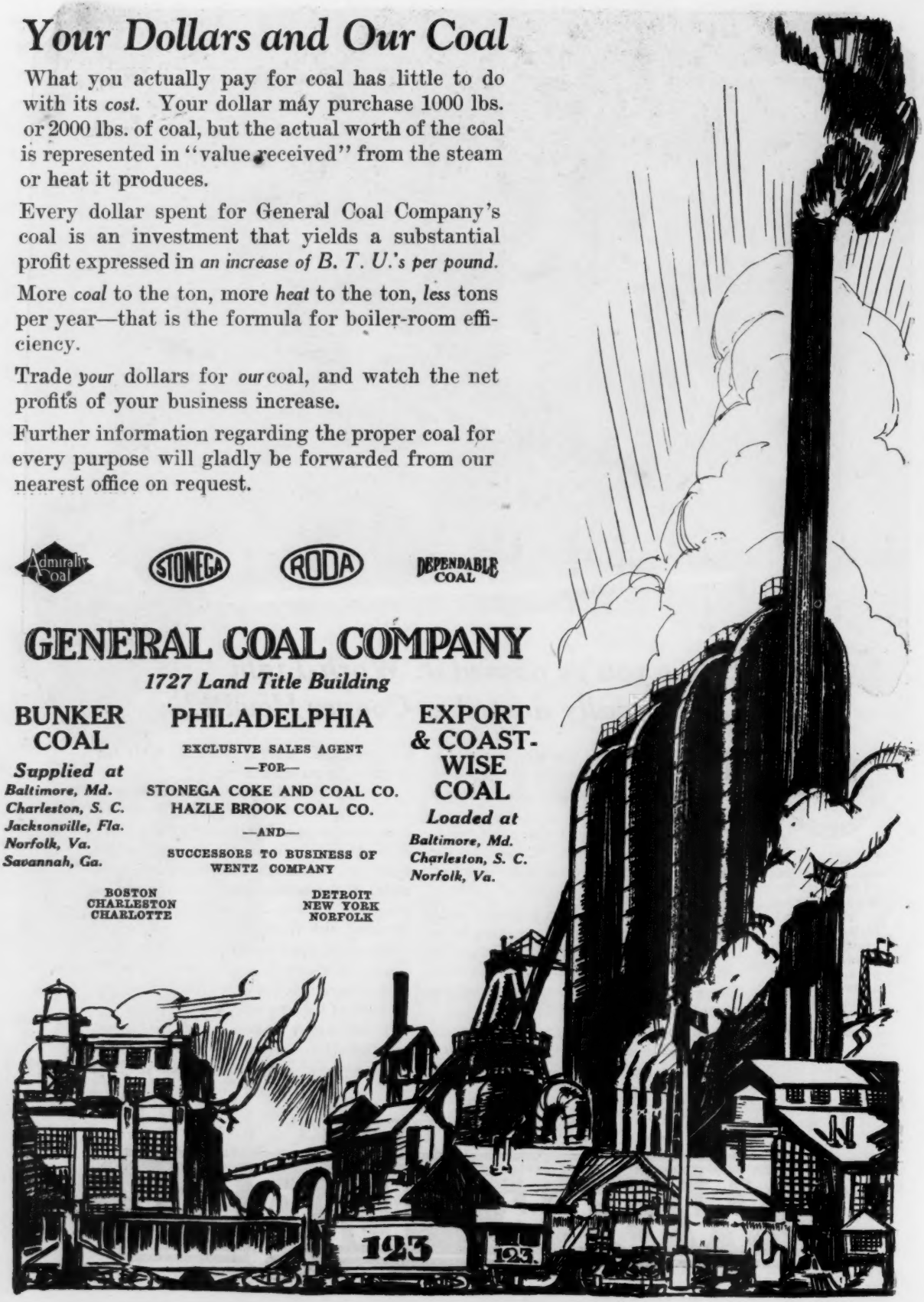
EXPORT & COAST-WISE COAL

Loaded at

Baltimore, Md.
Charleston, S. C.
Norfolk, Va.

BOSTON
CHARLESTON
CHARLOTTE

DETROIT
NEW YORK
NORFOLK



Is your lighting—and output—below normal?

Keep Your Voltage Up and Cut Down Waste

Waste is one of the worst "bug-bears" of the manufacturer.

Oftentimes decreased output is a result of improper lighting, and too frequently the trouble with illumination lies in the voltage. Only a 10% drop in voltage causes a 30%, and more, reduction in candle-power. So the latest types of fixtures and lamps will avail but little unless normal lamp voltage is maintained.

To those mills buying unregulated electric power from a Central Station, G-E Induction Regulators are of great value in holding constant voltage on lighting circuits to insure the best working conditions and consequent maximum output.

Central Stations find Induction Regulators a necessity for lighting feeders. Put them on *your* lighting circuits also.

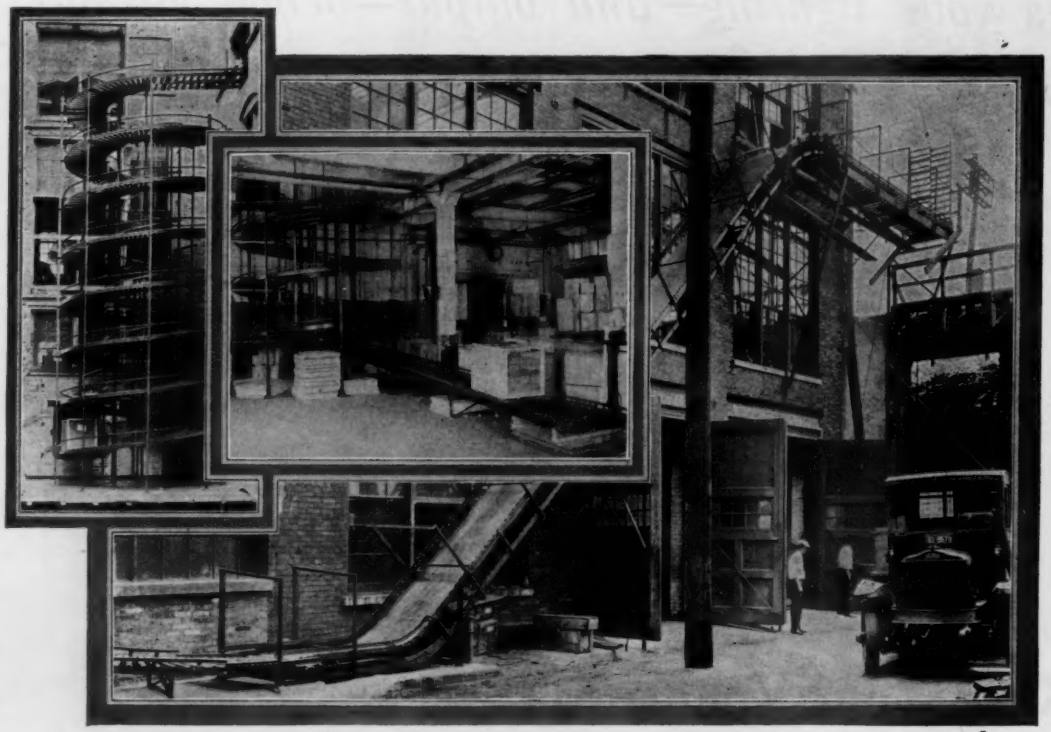
Induction Voltage Regulator, outdoor station type

Pole type

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

13B-41



From Top Floor—to the Cars —with Savings at Every Step

CAN you picture a smooth, convenient flow of products through your plant without a lost moment in transportation, or any manual labor except for loading and unloading? That's what this Mathews Conveying System has done for the Burson Knitting Company of Rockford, Illinois. Mathews Carriers have eliminated all handling of goods by slow elevators, truckers and trucks, from the time boxes leave the packing room on the fourth floor, until they are stored in a freight car ready to ship. At every step in this installation a definite saving was made, both in handling time and in cost of trucks and labor.

Boxes open on two sides, ride with absolute safety on the spiral conveyor—centrifugal force and specially made double rollers keep them in perfect position. In the packing room Mathews equipment has added another point to economy. The open boxes can be closed, weighed and marked without removing from the conveyor. Some boxes are put away for stock, the rest are caught by the push-bar elevator outside the building and deposited on a freight car on the elevated siding above. Previously a five-ton truck had to carry the shipping cases several blocks to a loading station.

Your handling problem may be simpler, or perhaps a great deal more complicated. But Mathews equipment can save for you as it did for the Burson Knitting Company, not only in speeding up material handling but in cutting many dollars from the pay-roll.

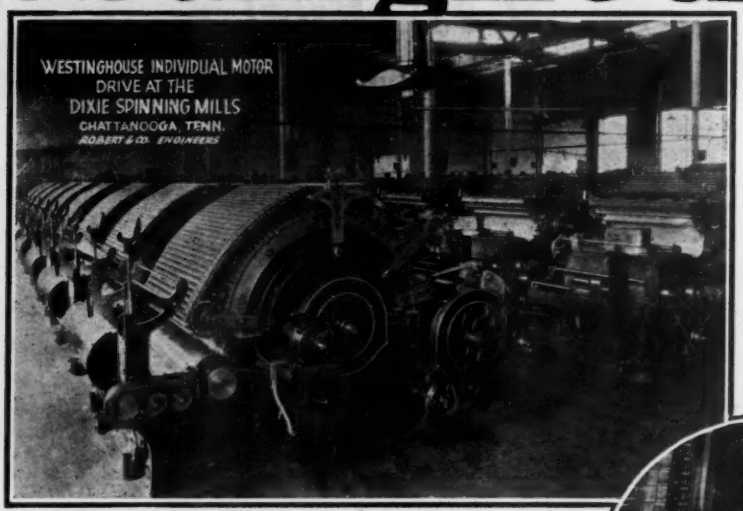
Apply these facts to your handling problem. Is there a place in your factory where Mathews conveyors could solve a similar problem for you and add many dollars to your profits? A Mathews man will gladly consult with you, or, if you wish, a catalog showing types of equipment adapted to every use will be sent you. A letter gives you prompt attention.

Mathews Conveyer Company

(Formerly Mathews Gravity Carrier Co.)

162 10th St. **Ellwood City, Pennsylvania**

Westinghouse



Their judgement confirmed

The first individual motor drive for cotton cards was made at the Dixie Spinning Company, Chattanooga, Tennessee. Sixty-five equipments comprised the installation.

With this method of drive all operations of the card are taken care of; and in addition, greater production, lower friction losses, and a cleaner product are obtained.

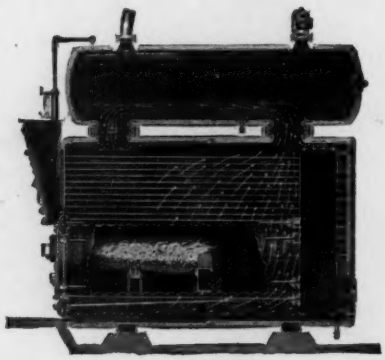
We acknowledge the foresight of the mill men and their engineers who thus became pioneers by installing this individual drive on their cotton cards. Their judgement has been confirmed by the service they have received from WESTINGHOUSE INDIVIDUAL MOTOR DRIVE.

WESTINGHOUSE ELECTRIC AND MANUFACTURING CO.
EAST PITTSBURGH PENNSYLVANIA

Sales Offices in all Principal Cities of the United States and Foreign Countries.

W
WESTINGHOUSE ELECTRIC

More Dry Steam With Less Fuel



HERE'S a perfect Scotch Boiler—a boiler that will generate more steam with less fuel.

Rapid, unrestricted circulation is absolutely necessary to the efficiency of any boiler, and while this feature is claimed for by many boiler manufacturers, the design of this boiler is such that it is positive at all times.

Large overload capacity, dry steam generated, and the remarkable flexibility of meeting fluctuating demands particularly adapts this boiler to severe conditions in industrial mills and plants.

Greatest economy is assured because of the circulating passage, which delivers water from the front neck to the bottom of the shell.

A constant temperature is assured because of this circulation which relieves uneven strains and stresses on this type of boilers.

There are no troublesome brick settings, as the boiler is self-contained and is ready for operation upon delivery.

Write today for detail information.

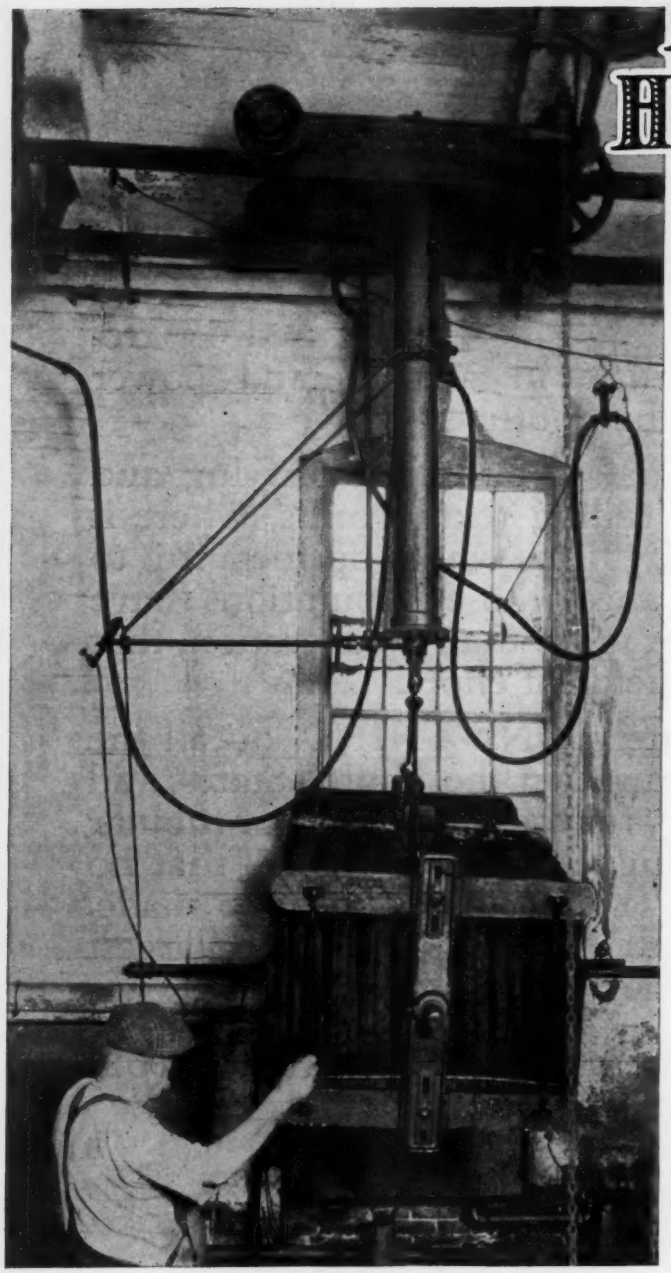
INTERNATIONAL ENGINEERING WORKS, Inc.
FRAMINGHAM, MASS.

Southern Representative, Isaac Hardeman, Charlotte, N. C.

BOSTON
PHILADELPHIA
NEW YORK
SAN FRANCISCO

CURTIS

AIR HOISTS



Used in The Textile Industry

Curtis one man All Steel Air Hoists and Curtis Roller Bearing Trolleys are effecting important economies in leading textile mills throughout the country.

Why not install a Curtis Air Hoist and operate it with the air you now have available? The wide variety of uses to which Curtis equipment can be most economically applied is worthy of your immediate investigation.

Curtis Pneumatic Machinery Company

1571 Kienlen Ave., St. Louis, Mo.

Branch Office

532-R Hudson Terminal, New York

CURTIS
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
C.P.M.Co.

Established 1854

YOUNGSTOWN PIPE

"YOUNGSTOWN" Pipe is now used in tremendous quantities in factories and power plants throughout the South.

It will be found in most of the humidifying and heating plants in leading textile mills, where it has been installed by firms whose business it is to know good pipe, and whose reputations have been, sometimes for more than a generation, that of leaders in their fields of effort.

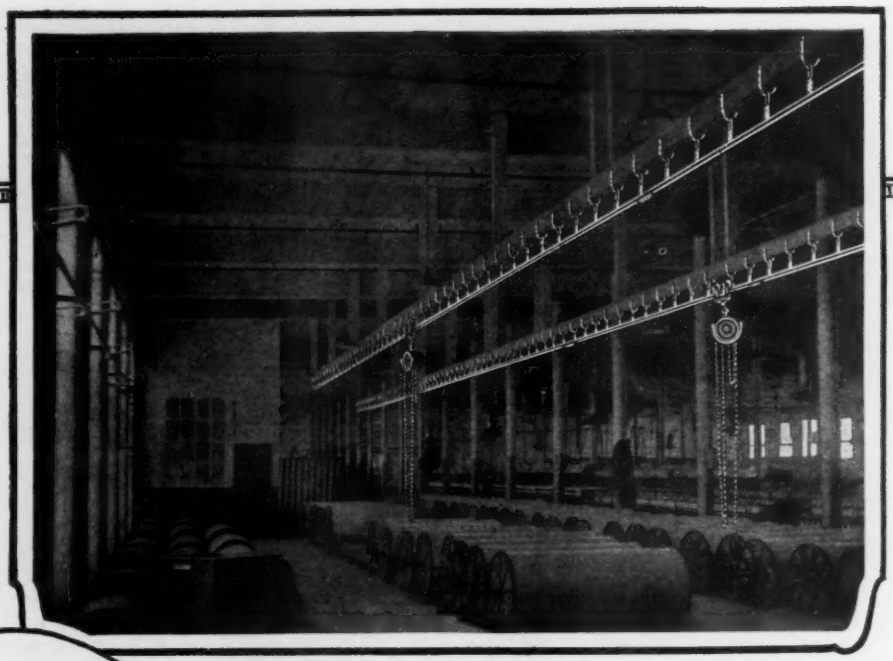
Making approximately ONE-THIRD of all the steel pipe manufactured in the United States, and having every facility for the production of tubular materials of the highest quality, we feel that no better pipe than "Youngstown" can be made. This opinion is shared by many of the largest users of pipe in America.

The Youngstown Sheet & Tube Company

Youngstown, Ohio

District Sales Offices

BOSTON—120 Franklin St.
NEW YORK—30 Church St.
PHILADELPHIA—Franklin Trust Bldg. 1506 Chestnut S.t
ATLANTA—Healey Bldg.
PITTSBURGH—Oliver Bldg.
CLEVELAND—Union Trust Bldg.
DETROIT—2021-2022 First National Bank Bldg.
CHICAGO—Conway Bldg.
CINCINNATI—Union Trust Bldg.
ST. LOUIS—1139 Olive St.
DENVER—First Nat'l Bank Bldg.
DALLAS—1401-2 Magnolia Bldg.
SAN FRANCISCO—Sharon Bldg.
SEATTLE—Central Bldg.
KANSAS CITY, MO.—1308 Commerce Bldg.
MINNEAPOLIS—608 Andrus Bldg.
NEW ORLEANS—Audubon Bldg.



Lanett Cotton Mills, West Point, Ga., equipped with Louden Overhead Carrying System. Stacking warp beams on platform.

Loads Up To 2000 Lbs.

Are easily handled by the Louden Overhead Carrying System—

From department to department—

From building to building—

Under any conditions.

The Louden Overhead Carrying System can be used for:

Conveying bales of cotton from warehouse to opening room.

Conveying warp beams to slashers for sizing and on to storage racks and looms.

Conveying raw cotton after dyeing, from kettles to storage rooms, and on to picker machines.

Conveying finished products from finishing departments to warehouses. Either inside of cases or in bales.

Handling machinery in machine shops or equipment in garages.

Moving coal, ashes, repair or building material.

For practically every load moving job in and around the mills.

By lowering operative costs the Louden Overhead Carrying System increases earnings.

It will pay you to investigate.

For a Larger Percentage of Profit

When you figure the high cost of lifting loom and section beams by hand, the breakage of beam heads, accidents to the men, loss of time, delays, etc., it is not difficult to see why so many mills are now using the

LOUDEN

OVERHEAD CARRYING SYSTEM

The illustration above shows how this system is used in the warper room of the Lanett Cotton Mills, West Point, Ga., for the storage of beams. Any beam desired is quickly and easily picked up and taken out. The Overhead System, which has done away with getting beams out by rolling them over the others by hand, is also used in front of the slashers to assist the men in doffing.

Practically every load lifting job about the mill, from coal handling to shipping platform, can be done quickly and cheaply with this equipment. Its easy adaptability to turns, corners, routing under line shafting and over machines and to all mill conditions is one of its most distinctive features.

The cost of Louden Overhead Carrying Equipment is so low that its savings wipe out the investment charge in just a few months. This is a point that impresses everyone who really looks into the possibilities of its use.

Let us suggest how this equipment could be used to profitable advantage in your mill. Investigate, without obligating yourself. Write for a copy of our illustrated catalog.

The Louden Machinery Company

552 West Ave. (Established 1867) Fairfield, Iowa

Albany Boston New York Philadelphia Buffalo Pittsburgh Cincinnati Cleveland Chicago St. Paul San Francisco Los Angeles

Valves that stand for
service and satisfaction
Small or large, for low or high pressures or temperatures, of Bronze, Iron Body Bronze Mounted, Steel Monel Mounted, or of All Iron for handling fluids which attack bronze alloys, a design particularly adapted for the purpose can be found in the comprehensive line of LUNKENHEIMER GLOBE AND ANGLE VALVES.
The completeness of the line makes possible standardizing on Lunkenheimer Valves with that resultant prolonged satisfactory service and economy of maintenance provided only by the Lunkenheimer method of manufacture.
For complete information write for a copy of Catalog 58.
LUNKENHEIMER
STEEL
THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK BOSTON
CHICAGO CINCINNATI, U.S.A. LONDON
EXPORT DEPT. 125-135 LAFAYETTE ST., NEW YORK

1300-24-10

ANNUAL

Roll Call

WHITE TRUCK FLEETS OF 10 OR MORE

In mighty unison the nation's foremost users proclaim the outstanding achievement in truck transportation

IN the May 10th issue of The Saturday Evening Post we publish in full the annual White Roll Call—transportation's biggest truck story. 755 of the country's foremost truck owners are operating 28,166 White Trucks in fleets of 10 or more. . . . This is an increase of 162 owners and 6,393 trucks over last year's record.

Truck by truck, name by name, year by year, the building of the White Roll Call has gone on, twice around the 7-year business cycle. Experience and comparison have speeded standardization on Whites. Among the tens of thousands of owners of smaller White fleets or single White Trucks are names that will be on a future White Roll Call.

Ever increasing hundreds of experienced, astute buyers express lasting faith in White Truck dependability, durability and economy by pyramiding their investments to millions of dollars. White Trucks justify this faith.

Each one of the hundreds of fleets listed on the White Roll Call tells the separate story of a separate transportation problem solved profitably by White Trucks. Only by consistently giving the most money-earning miles in all lines of business, everywhere, could White Trucks make the White Roll Call what it is—

A fact structure defying imitation.

No other truck manufacturer has ever published such a record. No other truck manufacturer can.

Assuring continuous, sustained transportation everywhere

Get this wonderful record. It has been printed in a booklet. Check it over for the names of big fleet owners in your locality. Check it for the names of leading companies in any truck-using line of business—in your own business. It will be sent you gladly by The White Company, 842 E. 79th Street, Cleveland, Ohio. Write for it. No obligation. We will be glad to send, too, other booklets dealing with the performance of White Trucks in specific industries.

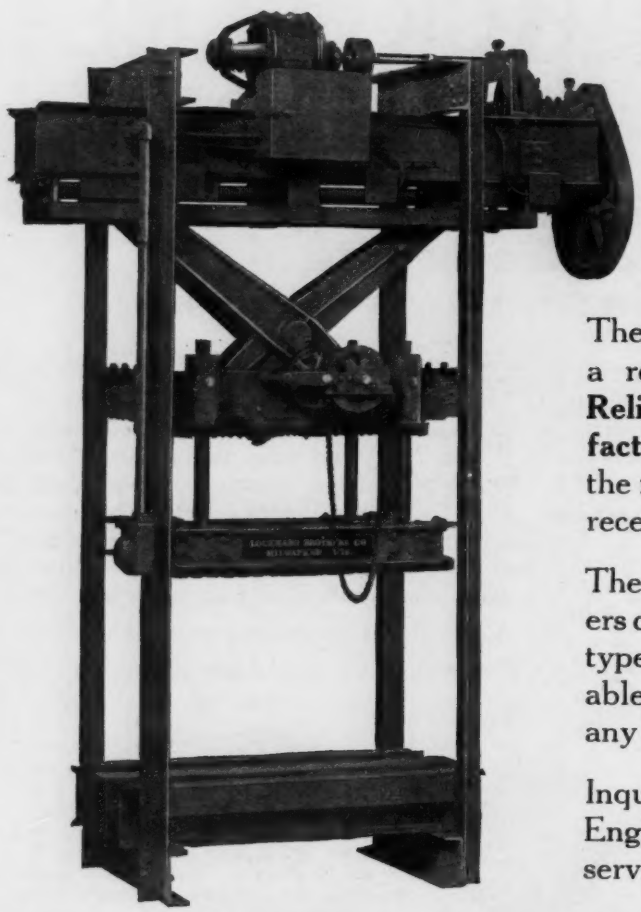
THE WHITE COMPANY
CLEVELAND

WHITE TRUCKS

LOGEMANN

Hand-Belt-Electric-Hydraulic

Baling — Presses



USED FOR MANY YEARS IN HUNDREDS OF TEXTILE MILLS THROUGHOUT THE COUNTRY

These balers have established a reputation for **economy, Reliability** and **General Satisfaction** that is best indicated by the numerous repeat orders we receive continually.

The LOGEMANN line of balers consists of more than eighty types and capacities and a suitable press can be furnished for any purpose.

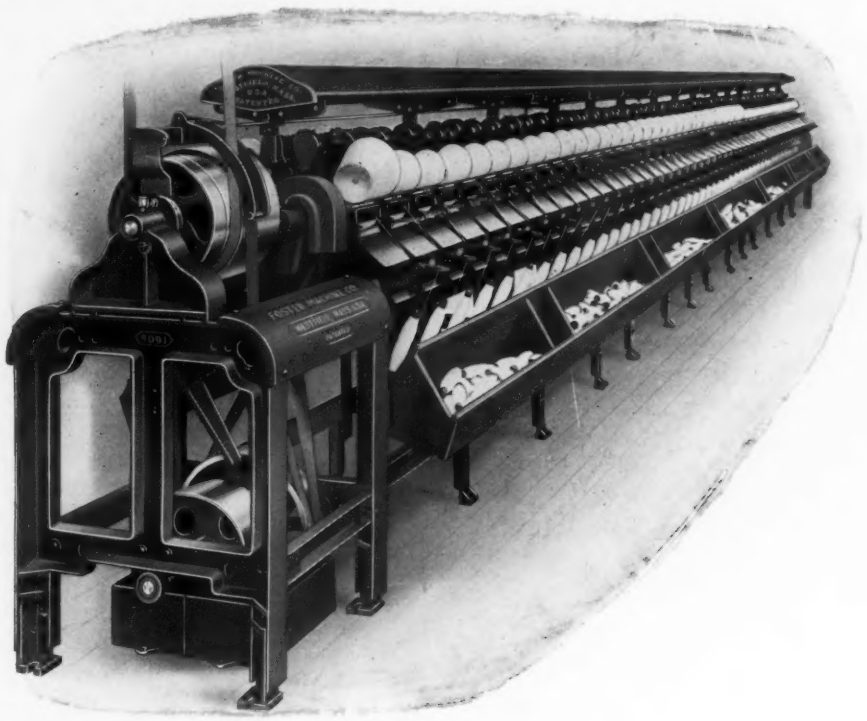
Inquiries are solicited and our Engineering Staff is at your service.

LOGEMANN BROTHERS CO.

Main Office & Works - Milwaukee, Wis.

3102 Burleigh Street

CONE WINDING



FOSTER MODEL THIRTY CONE WINDER

Hosiery and Underwear Knitting Yarn will be in the best marketable form if Foster finished.

Foster wind is distinctive in the taper of the cone, angle of wind and lay of yarn on the cone surface and will give off on the Knitting Machine without variation of tension.

The Model Thirty Cone Winder is of the usual FOSTER STURDY SIMPLE DESIGN.

FOSTER MACHINE COMPANY

WESTFIELD, MASS.

John Hill, Southern Representative, Healey Bldg., Atlanta, Ga.

51 Years' Success

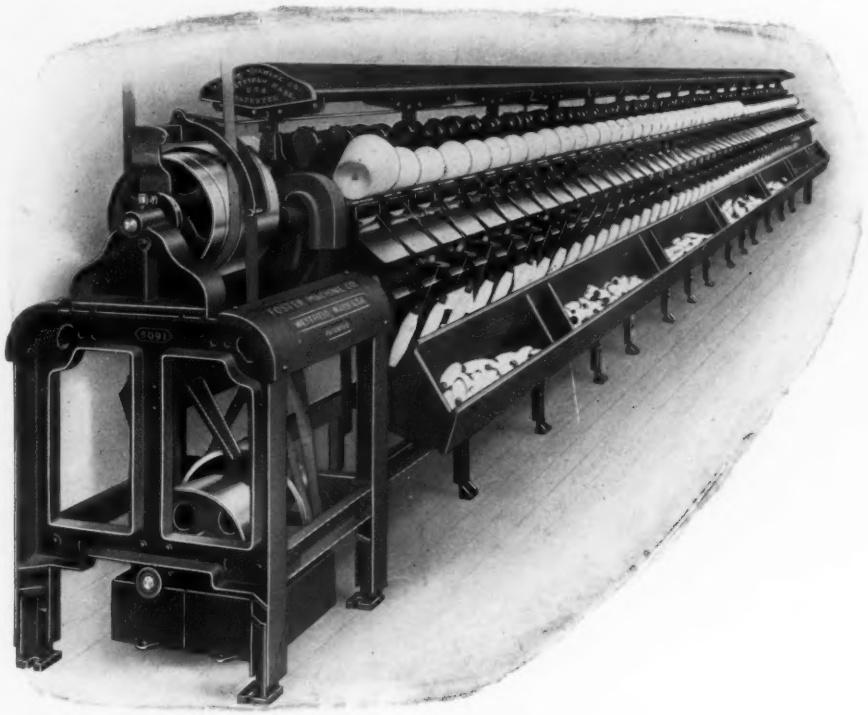
1873 1924

Spinning Rings Twister Rings
Silk Rings Traveller Cleaners
Traveller Cups GuideWireSets

The Best That Experience Can Produce-That Money Can Buy

Whitinsville Spinning Ring Co.
Whitinsville, Mass.

CONE WINDING



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Traveller Cups GuideWireSets

The Best That Experience Can Produce-That Money Can Buy

Whitinsville Spinning Ring Co.
Whitinsville, Mass.

THE FUN-FUL LINE

PLAYGROUND EQUIPMENT

349 Cotton Mills Using FUN-FUL!

A few of them

Pacific Mills—Columbia, S. C.
Columbia Mills—Columbia, S. C.
Wymojo Mills—Rockhill, S. C.
Woodside Mills—Greenville, S. C.
Pacolet Mills—Pacolet, S. C.
Drayton Mills—Spartanburg, S. C.
Monarch Mills—Union, S. C.
Langley Mills—Langley, S. C.
Grendel Mills—Greenwood, S. C.
Greenwood Mills—Greenwood, S. C.
Belton Mills—Belton, S. C.
Loray Mills—Gastonia, S. C.
Gray Mills—Gastonia, S. C.
Arlington Mills—Gastonia, S. C.
Flint Mills—Gastonia, S. C.
Cannon Mills—Kannapolis, N. C.
P. H. Hanes Mills—Winston-Salem, N. C.
Proximity Mills—Greensboro, N. C.
Durham Mills—Durham, N. C.
Roxboro Mills—Roxboro, N. C.
Tolar-Hart-Holt Mills—Fayetteville, N. C.
Hart Mills—Tarboro, N. C.
Pilot Mills—Raleigh, N. C.
Cardinal Mills—West Point, Miss.
Lauderdale Mills—Meridian, Miss.
Danville Mills—Danvillle, Va.
Schoolfield Mills—Schoolfield, Va.
Bonham Mills—Bonham, Texas.
Sherman Mills—Sherman, Texas.
Corsicana Mills—Corsicana, Texas.
Itasca Mills—Itasca, Texas.
Brazo Valley Mills—West, Texas.
Prendergast Mills—Prendergast, Tenn.
Davis Mills—Chattanooga, Tenn.
Avondale Mills—Birmingham, Ala.
Lanettt Mills—Lanett, Ala.
Anniston Mills—Anniston, Ala.
Montgomery Mills—Montgomery, Ala.
Fulton Bag Mills—Atlanta, Georgia.
Exposition Mills—Atlanta, Georgia.
Calloway Mills—LaGrange, Georgia.
Moultrie Mills—Moultrie, Georgia.
Trion Mills—Trion, Georgia.
LaFayette Mills—LaFayette, Georgia.
Bibb Mills—Macon, Georgia.
International Mills—LaGrange, Georgia.

At the Brazilian Centennial Exhibition at Rio de Janeiro, Brazil, South America, which has just closed, HILL-STANDARD Equipment was awarded the gold medals.

Catalog on request

HILL-STANDARD CO.

Anderson, Our 23rd year Indiana

COPY AVAILABLE

Let Us Add Your Name To This List

OUR service to textile mills is the result of years of experience in installing textile theatre equipment. Our representatives call upon the mills personally, lay out the plans, advise on the proper equipment required and finally supervise the installation and the starting of the theatre. In other words, they take the whole problem off your hands and do not turn over the work to you until the theatre is operating satisfactorily.

The textile industry is demanding the best moving pictures for their employees and that is why they regularly specify POWER'S PROJECTORS.

That is why more Power's Projectors are used by textile mills in the South than all other projectors combined.

We carry a complete line of supply parts and equipment at our various branches. Your orders for supply parts will be filled the same day the order is received. Whatever are your needs for your theatre, we can supply them.

We have a special offer for Textile Mills. May we present it to you?

Satisfied Users of POWER'S PROJECTORS

ALABAMA

W. A. Handley Mfg. Co. ..... Roanoke
Tallassee Mills ..... Tallassee
Fairfax Mill ..... Fairfax
Avon Mills ..... Sylacauga
Lanett Cotton Mills ..... Lanett
Indian Head Mills ..... Cordova
Selma Mfg. Co. ..... Selma
Buck Creek Cotton Mills ..... Siluria

GEORGIA

Elm City Cotton Mills ..... LaGrange
Bibb Mfg. Co. ..... Porterdale
Roswell Mfg. Co. ..... Roswell
Gainesville Cotton Mill ..... Gainesville
Bibb Mfg. Co. ..... Columbus
Pacolet Mfg. Co. ..... New Holland
Manchester Cotton Mills ..... Manchester
Milstead Mfg. Co. ..... Milstead
Thomaston Cotton Mills ..... Thomaston
Exposition Cotton Mill ..... Atlanta
Habersham Mill ..... Habersham
Trion Company ..... Trion
Union Point Mfg. Co. ..... Union Point
Hillside Cotton Mill ..... LaGrange

NORTH CAROLINA

Durham Hosiery Mills ..... Durham
Pamona Mills ..... Greensboro
Cleveland Mill & Power Co. ..... Lawndale
Rodman-Heath Cotton Mills ..... Waxhaw
Rocky Mount Mills ..... Rocky Mount
Cherokee Falls Mfg. Co. ..... Cherokee Falls
Roxboro Cotton Mills ..... Roxboro
Consolidated Textile Corp. ..... Burlington
Carolina Cotton & Woolen Mills ..... Spray
Erwin Cotton Mills ..... Duke
Cannon Manufacturing Co. ..... Kannapolis

SOUTH CAROLINA

Baldwin Cotton Mills ..... Chester
Tucapau Mills ..... Tucapau
Ware Shoals Mfg. Co. ..... Ware Shoals
Glenn-Lowry Mfg. Co. ..... Whitmire
Monaghan Mills ..... Greenville
Drayton Mills ..... Spartanburg
Victor Mills ..... Greer
Conestee Mills ..... Conestee
Kershaw Cotton Mills ..... Kershaw
Abbeville Cotton Mills ..... Abbeville
Chesnee Mills ..... Chesnee
Union-Buffalo Mills ..... Buffalo
Victor-Monaghan Mills ..... Seneca
Victor-Monaghan Mills ..... Jonesville
Pacolet Mfg. Co. ..... Pacolet
Arogon Mills ..... Rock Hill
Graniteville Mfg. Co. ..... Vancluse
Woodside Cotton Mills ..... Greenville
Orr Cotton Mills ..... Anderson
Issaqueena Mills ..... Central
Clifton Mfg. Co. ..... Clifton
D. E. Converse Co. ..... Glendale
Winnsboro Mills ..... Winnsboro
Monarch Mills ..... Lockhart
Republic Cotton Mills ..... Great Falls

Southern Theatre Equipment Company

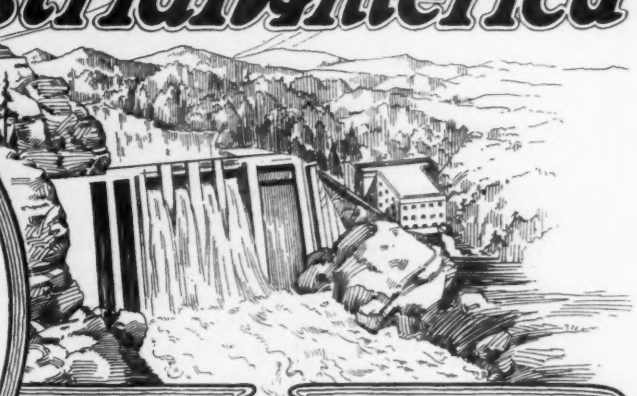
WILLIAM OLDKNOW, President.

100 WALTON STREET
ATLANTA, GEORGIA

THREE TWENTY-EIGHT CALIFORNIA ST.,
OKLAHOMA CITY, OKLA.

1907 COMMERCE ST.
DALLAS, TEXAS

Tennessee—The Heart of Industrial America



The Kind of Labor That is Loyal and Stable

Labor, one of the biggest problems of the textile mill in other sections of the country, is a simple matter in Tennessee.

There, the labor supply is native-born, pure American stock, chiefly from the mountains, strong healthy men, women and children, who, hardened to the rough work in their mountainous homes, regard the life of a mill operative as one of comparative ease and the work interesting. These people are of much higher type morally than the element in other industrial sections. They are naturally intelligent, easily trained, and develop a high degree of efficiency. They are home loving people and show no inclination to migrate to other sections, preferring to remain in their native hills and with their own kind. They are extremely loyal and respond quickly to fair treatment. Although they are people of pride and cannot be driven or intimidated, they are the kind that quickly resent a word against their employers and stick to them through thick and thin. They prefer peace and contentment to any troublesome labor disturbances. Speaking and thinking the same language, there is an atmosphere of contentment that cannot be found elsewhere.

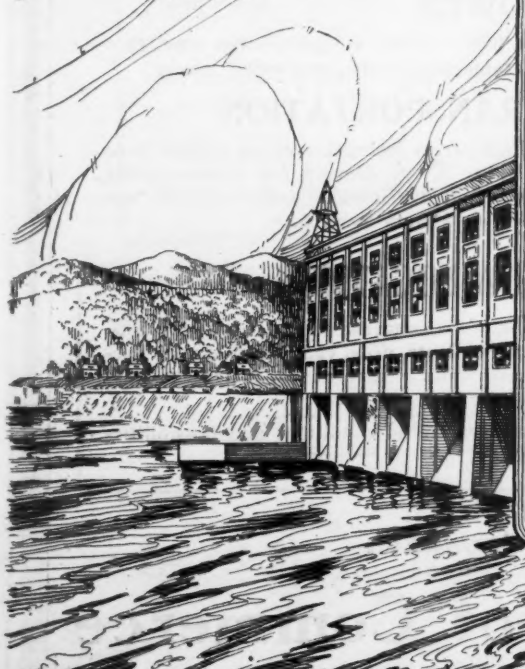
They are content to work for less because they can live for less in Tennessee. The mild climate requires less to be spent for heat, shelter, heavy foods and clothing. The long growing season provides foodstuffs and fresh vegetables the year round at lower prices.

The labor supply has hardly been touched in Tennessee. It is at your command if you locate your mill or branch plant there.

Ask us for full information about Tennessee and its many industrial sites and numerous advantages to industry.

THE TENNESSEE ELECTRIC POWER CO.

CHATTANOOGA, TENN.



The Tennessee Electric Power Co.

Atlanta is United for Service

Newcomer and old resident, alike, derive material benefit from perfect coordination of effort by Atlanta's many organizations of Business and Professional Men and her Chamber of Commerce.

The Chamber of Commerce is spending $35,000 during 1924 in the extension of the work of its Industrial Bureau, in preparing for distribution attractive literature on conditions and possibilities in Atlanta and vicinity, in enlarging its house organ, the "City Builder," and in placing attractive road signs on the highways leading into the city.

The Industrial Bureau of the Chamber of Commerce is making a survey of Atlanta factories to ascertain the cost of various commodities, the source of supply of raw products, the market for the finished products, the wages paid, the freight and distribution costs, the taxes, power, etc.

Atlanta's every organization cooperates unstintedly with her Chamber of Commerce, thus endowing Atlanta with a wonderful unity-of-purpose for accomplishment. "The Atlanta Spirit," a sentiment famed throughout the world, is directly traceable to this fixed policy of "ATLANTA IS UNITED FOR SERVICE."

Atlanta Is The Logical Southeastern Location For Industries, Branch Factories and Distributing Offices

Five of the great basic essentials for manufacturing and distributing at a profit are available in the Atlanta District.

RAW MATERIALS

The Atlanta District is an extensive area within which the RAW MATERIAL can be assembled for the manufacture of products at a cost which gives the manufacturer a great natural advantage over manufacturers located at less favored spots. In the Atlanta District RAW MATERIALS may be secured at home.

LABOR

Atlanta is an "Open Shop" Town. An Employers' Association is amply able to supply labor to industries as needed.

FUEL

An abundance of coals, high in fixed carbons and low in ash, as well as high volatile coals. Fuel oil is often available at attractive prices.

POWER

Atlanta centers a Super-Power zone, thus guaranteeing steady, economical power.

TRANSPORTATION

Eight great railroad systems radiate from Atlanta. Every demand for manufacturing needs and distribution is economically met from an Atlanta location.

ARE YOU LOOKING FOR A LOCATION

The Atlanta District offers special advantages to cotton mills, underwear and hosiery plants, clothing and garment factories, roofing, bottle, tile and pottery plants, drug, candy and cracker factories. An especially large number of the industries now in Atlanta require mainly male help, leaving an especially large supply of female labor available.

We are prepared to send to interested manufacturers literature on conditions and possibilities in Atlanta and the State of Georgia.

Write for Specific Information

Atlanta Chamber of Commerce

B. S. BARKER, Secretary — Atlanta, Georgia

The Cream Is Still Unskimmed—In Georgia

It's Great to Be a Georgian!

Georgia has

- High elevation above sea level
- Temperate climate
- Proximity to cool mountain resorts
- Adequate freight facilities
- Location at source of raw cotton supply
- Plenty of cheap and dependable hydro-electric power immediately available.
- Friendly public sentiment
- Plenty of native American labor

Copy of our booklet, "Industrial Georgia: Cotton Manufactures," giving accurate general information about all of North Georgia and detailed information about the industrial advantages of dozens of live Communities that are now seeking new industries, will be furnished upon request.

Nowhere else does opportunity beckon more insistently than here in Georgia.

Georgia Railway & Power Co.
Atlanta

Stafford Improved Dobby

Why not take advantage of the vogue for fancy goods and equip your plain looms with dobbies? There is no better time to install them than the present.

Stafford dobbies have been used exclusively for a great many years by mills, large and small, both in this country and elsewhere. They may be attached to either our own or other makes of looms by application of the necessary fittings. Jumper motions, slackeners, etc., may be attached as desired. From a mechanical standpoint Stafford dobbies are unsurpassed in design, workmanship, accessibility of parts and general all-round excellence.

We have prepared a booklet dealing specifically with our dobby which we would be more than pleased to send you. Address our nearest office or, if more convenient, write us direct.

THE STAFFORD COMPANY

Weaving Machinery

READVILLE, MASS.

STAFFORD

Southern Agent—Fred H. White, Charlotte, N. C.
Branch Office—502 Colt Bldg., Paterson, N. J.

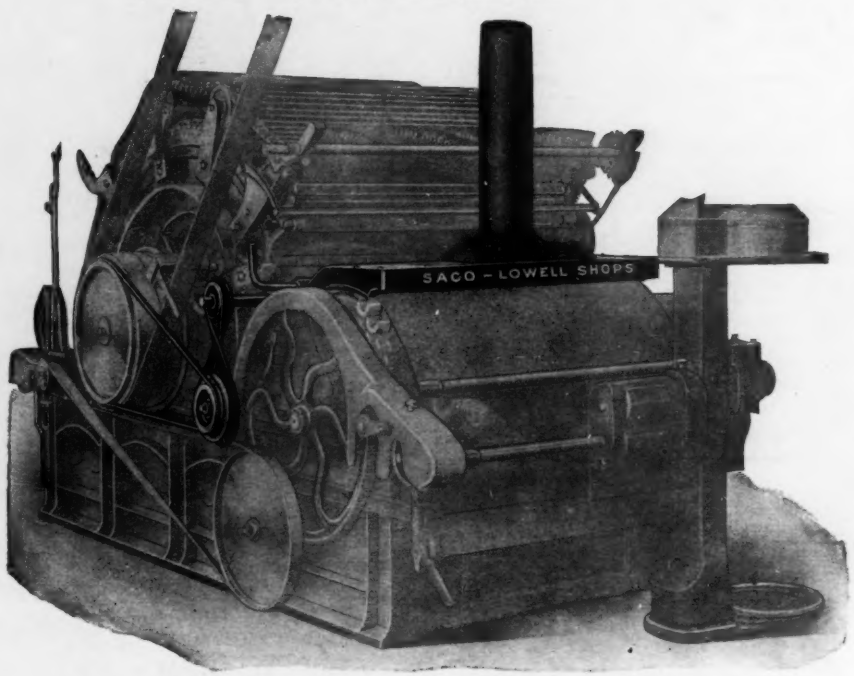
Canadian Representatives—
Whitehead, Emmans, Ltd., Montreal.

STAFFORD

SACO-LOWELL

Labor Saving Equipment for Cotton Spinning Mills

SACO-LOWELL CARD STRIPPER



$1,800 Annually Saved in Labor by $5,000 Investment

Actual figures showing the saving made by Saco-Lowell Card Stripper in a mill that has sixty revolving flat cards.

Without Saco-Lowell Stripper			With Saco-Lowell Stripper	
4 Tenders @ $1,040.00	$4,160		4 Tenders @ $1,040.00	$4,160
2 Strippers @ 910.00	1,820			
Total	$5,980.00		Total	$4,160.00

Saving $1,820.00

Strips Conveyed to Picker Room or Waste House, cleaned, uninjured, easily reworked or sold. No dust in stripping. Time required to strip 60 cards, 20 minutes.

SACO-LOWELL SHOPS

CHARLOTTE, N. C.

Executive Offices
No. 1 Federal St.
Boston, Mass.

Branch Sou. Office
Masonic Building
Greenville, S. C.

Patents Pending

TEXPRO Roving Bobbins

HERE is a Roving Bobbin designed and constructed to produce better results and to effect economies in operation.

TEXPRO Bobbins are made of Cast Pulp and are but half the weight of wooden bobbins, yet they possess great strength and rigidity. They can not split, crack or warp and they will withstand a vast amount of rough usage and abuse.

TEXPRO Bobbins are treated with TEXTILAC, a special process applied by the TEXTILAC Company, Pawtucket, R. I., which penetrates the very fibre of the unit, adding strength and durability and rendering them impervious to atmospheric conditions.

Note the Ferrule: It is made of metal and assembled to the Cast Pulp form. It can not come loose and it engages readily to the driving pin. The use of this Ferrule means lasting strength to the bobbin. The knobs at the base will not break because of hard usage, accidental dropping or other abuse.

This metal Ferrule, as you will see by the illustration, extends up inside the base of the bobbin and thus withstands the great wear that unprotected other type bobbins are subjected to at this point.

TEXPRO Cast Pulp Roving Bobbins mean more efficient operation, freedom from many bobbin troubles and longer bobbin service. They are made to fit all standard frames.

Send for sample TEXPRO Cast Pulp Roving Bobbin. Examine it carefully, put it to work. You will at once recognize its many superior qualities.

Mfd. Under Drake Patents.

THE TEXTILE PRODUCTS CO.

HARTFORD, CONN.

TEXPRO BOBBINS

—cost less and last longer

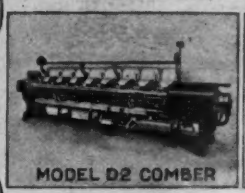
TEXPRO cast pulp BOBBINS

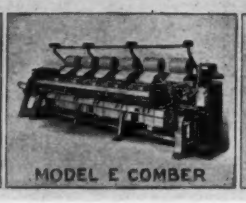
WHITIN MACHINE WORKS

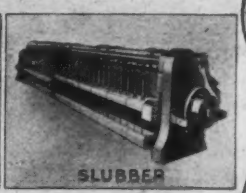
ESTABLISHED 1831

TEXTILE MACHINERY

MAIN OFFICE AND WORKS, WHITINSVILLE, MASS., U.S.A.







Manufacturers

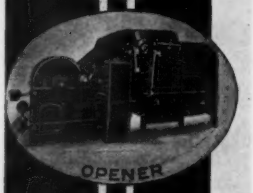
of

Cotton and Cotton Waste Picking Machines

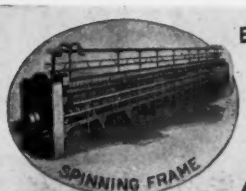
comprising

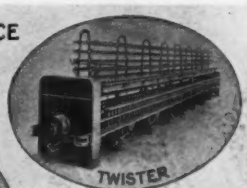
Bale Breakers, Cotton Cleaners, Feeders, Vertical Openers, Condensers, Distributors, Openers, Breakers and Finisher Lappers, Willows, and Hard Waste Machines.

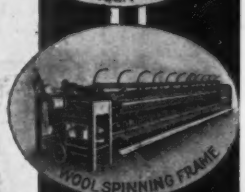
Full Particulars on Request

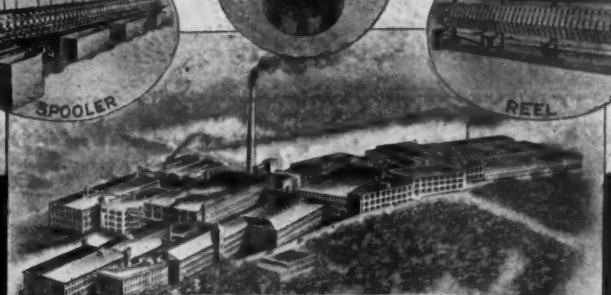


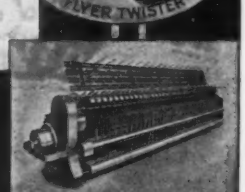
BRANCH OFFICE
CHARLOTTE,
N.C., U.S.A.

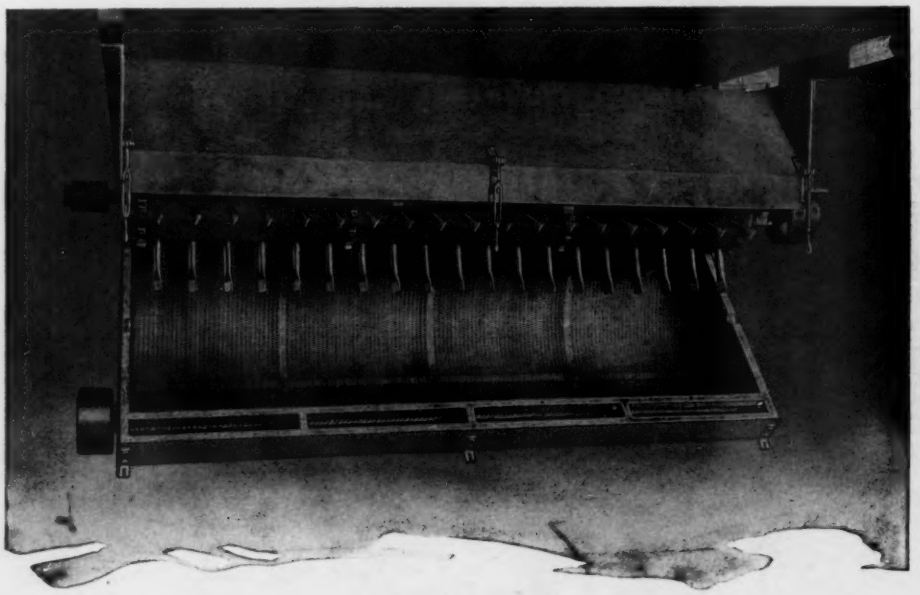












Put Your Conveyor Pipe to Work

You can give your cotton a thorough cleaning, opening and aerating, while it's being conveyed from the bale breakers to the picker room. The Murray Cotton Cleaning and Aerating Machine forms a part of the conveyor pipe, and vastly improves the stock before it is fed to the pickers.

The "Murray" takes up very little extra space since it can be hung from the ceiling. Its supply of cotton is drawn through it by the suction of the conveyor pipe fan, no additional fan or increased draft being necessary. A further economical feature is the fact that the "Murray" requires practically no attention since the dirt is automatically disposed of through a chute at one end.

Handles 2,500 Lbs. Hourly.

2,500 pounds of cotton per hour can be cleaned, opened and aerated in the Murray machine at a power expenditure of only 3 to 5 H.P. The stock is given a thorough treatment by 114 revolving arms.

The Bowling Green Spinning Mills write us stating "The Opener we purchased from you is giving entire satisfaction in every way. In fact we think it is a wonderful machine."

THE MURRAY COMPANY, ATLANTA, GA.

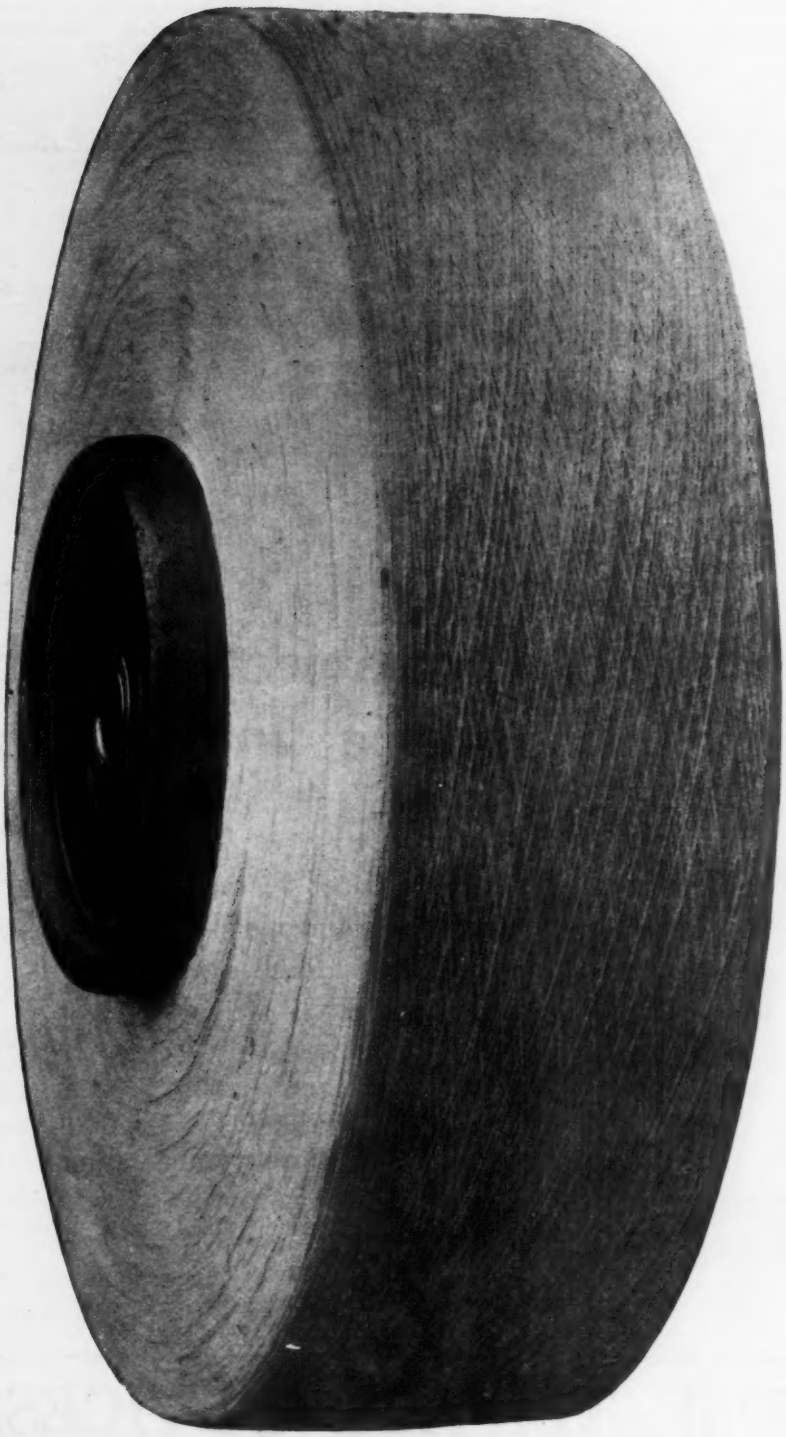
Northern and New England Sales Representatives:
Aldrich Machine Works
P. O. Box 132, Providence, R. I

Carolina Sales Representatives:
Carolina Specialty Co.
Brevard Court
Charlotte, N. C.

The Murray
(PAT. PENDING)
COTTON CLEANING AND AERATING MACHINE

COTTON WELL OPENED IS HALF SPUN

AUTOMATIC SPOOLERS, HIGH SPEED WARPERS

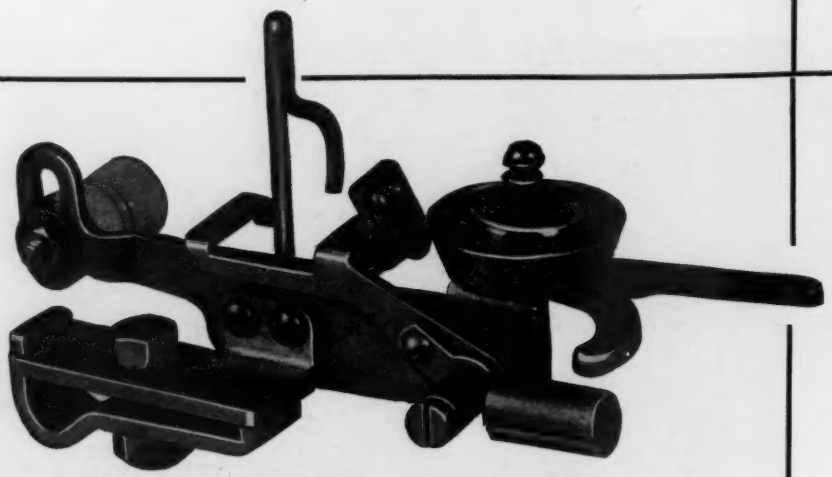


NO SPOOLER KINKS, EVERY KNOT A WEAVERS KNOT"

BARBER-COLMAN COMPANY

ROCKFORD, ILLINOIS

BOSTON, MASS. GREENVILLE, S. C.



The Eclipse Slub Catcher and Tension Device is Ready *for service in your mill*

The device shown above can be used successfully on both spoolers and winders and can also be used with either warp or filling wound yarn. The machine is self threading and will adjust itself to any size yarn—cotton, silk or wool.

Send today for illustrated booklet which explains the details of operation and shows you how you can save time, money and trouble with the Eclipse.

ECLIPSE

ECLIPSE TEXTILE DEVICES, INC.

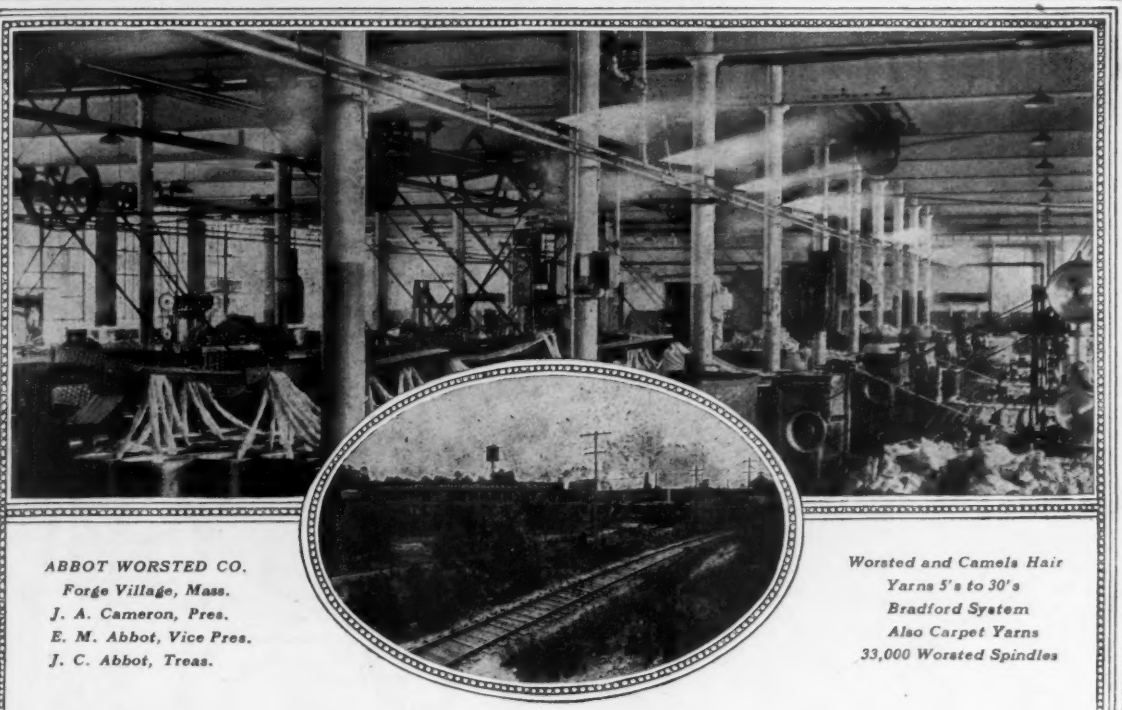
ELMIRA, NEW YORK

Eclipse
Automatic Yarn Cleaners
Eclipse
Yarn Tension Devices

MAKERS OF

We are also makers of the famous Eclipse Bendix starter for automobiles and the time proven coaster brake for bicycles.

Eclipse
Automatic Stop Motions
Van Ness
Random Dyeing Machines



ABBOT WORSTED CO.
Forge Village, Mass.
J. A. Cameron, Pres.
E. M. Abbot, Vice Pres.
J. C. Abbot, Treas.

Worsted and Camels Hair
Yarns 5's to 30's
Bradford System
Also Carpet Yarns
33,000 Worsted Spindles

Static Electricity and Poor Yarns

What is static electricity? Nobody knows. But anybody who has anything to do with cotton or worsted spinning knows how it holds back production.

Anybody who has anything to do with cotton or worsted spinning knows how to kill static. Knows—has known for many years—that moisture will do it. Knows that even dampening the floor will help—or steam vapor turned into the room.

He also knows that these are only makeshifts. Finally he comes to recognize that getting rid of static is only part of a nice engineering study in Air Conditioning, and he brings his problems to those who have made this a study.

Send for our new book —Air Conditioning Practice in Woolen and Worsted Mills.

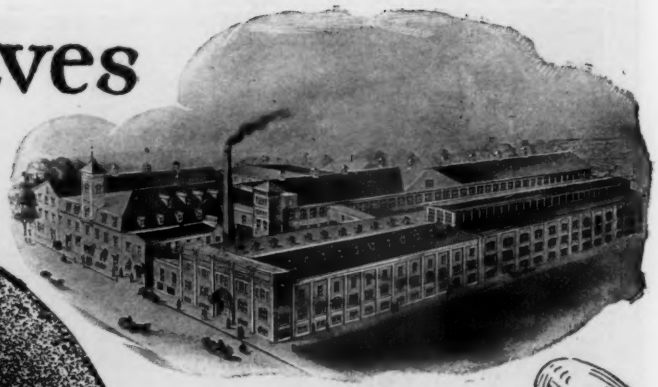
Parks-Cramer Company

Engineers & Contractors
Industrial Piping and Air Conditioning

Fitchburg Boston Charlotte

Right Regain

Quality Leaves It's Mark



Emmons

THE name "Emmons" has left its imprint on the textile world as the mark of quality in loom harness and reeds. Cheapness for cheapness' sake has been avoided, but by giving maximum quality at a fair price, the business of this institution has grown until today the Emmons Loom Harness Company is the largest manufacturer of loom harness and reeds in America.

There are few mills in this country who do not use one or more Emmons Products. To these users they need no introduction—their high quality, reliability and serviceability having made a lasting impression.

To the other few who may be seeking better grade products at a fair price, we offer service and satisfaction which they have not experienced elsewhere.

Write "Emmons" on your next order. Write us for prices.

EMMONS LOOM HARNESS CO., LAWRENCE, MASS.

Largest Manufacturers of Loom Harness and Reeds in America

SOUTHERN REPRESENTATIVE: GEO. F. BAHAN.

EMMONS PRODUCTS

COTTON HARNESS
MAIL HARNESS
SELVEDGE HARNESS REEDS
SLASHER AND STRIKING COMBS
WARPER AND LIECE REEDS
BEAMER AND DRESSER HECKS
MENDING EYES
JACQUARD HEDDLES, ETC.

Sole Agents for Wardwell Pickers

EMMONS
LOOM HARNESS AND REEDS

The Practical Spool

It is impractical to use antiquated methods and equipment in the modern textile mill, and when it comes down to the question of spools, the old head-breaking, wooden spool is just as antiquated and impractical as the old-time loom.

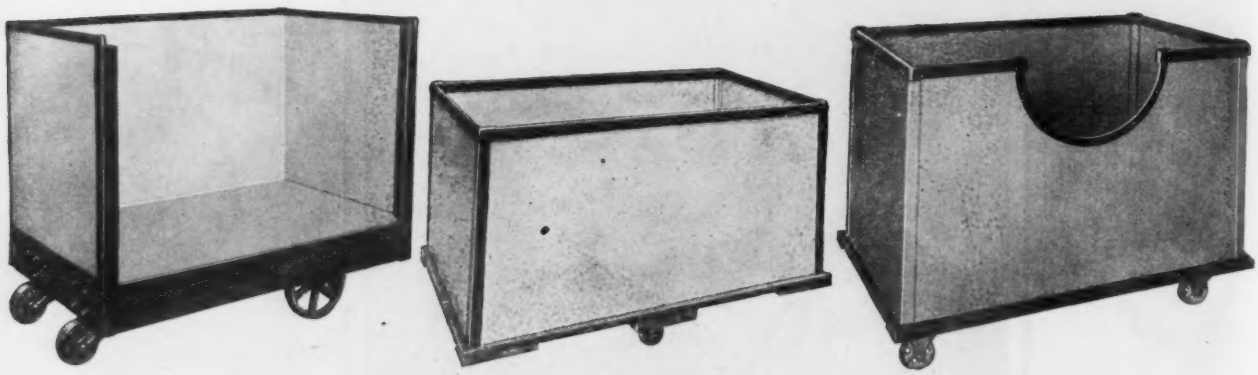
The practical spool is the Smil-Bob—the last word in a smooth, indestructible, long-lasting spool—a spool that stops that yarn wastage on account of broken heads—a spool that saves spool replacement costs—a spool that saves time and labor—a spool that runs smooth and true and makes possible increased traverse and greater yardage.

The red vulcanized fibre head of the Smil-Bob will never splinter, crack nor come off. It's a head that is indestructible for all practical purposes. The fact that it is manufactured and backed by the L. C. Smith Bobbin Works' reputation is ample guarantee of its high quality.

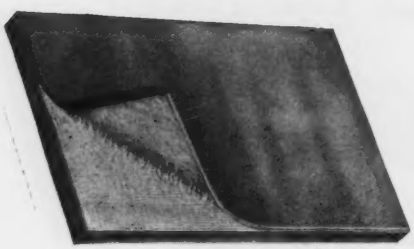
Smil-Bobs may be secured in any type and size. They are real investments in spools. Ask for sample and prices today.

L. C. SMITH BOBBIN WORKS, PHILLIPSBURG, N. J.

Indestructible SMIL-BOB Fibre Head SPOOLS



Trucks that are "slam-bang" proof



Note the patented construction

—of Haskins Veneered Steel by which the steel, and wood core are bound closely together. As further insurance all edges are steel protected in the Haskins Armord Truck.

These trucks are made in various types and sizes. We can meet your specifications with just the truck you need. Write us mentioning specifications and we'll be glad to quote.

If so desired, Haskins Veneered Steel can be supplied for any use which requires a light durable sheet.

Haskins Veneered Steel Gives Them Great Resistance to Wear

"Will it last?" is the first question that the wise mill man asks. He knows that whatever truck he may buy will get plenty of hard work and hard knocks.

It is among careful buyers that Haskins Armord Trucks are steadily gaining in popularity. Wherever in service, they stand the test of hard usage.

Altho' careful workmanship plays an important part, it's the material itself that's the chief reason for the wear resistance of Haskins trucks.

The steel makes a smooth surface

—which is adequate insurance against the tearing and injuring of choice fabrics.

The veneered steel cannot, of course, splinter. Its great strength and rigidness enable it to ward one severe blow after another, and maintain its smooth surface.

These trucks are easy to handle

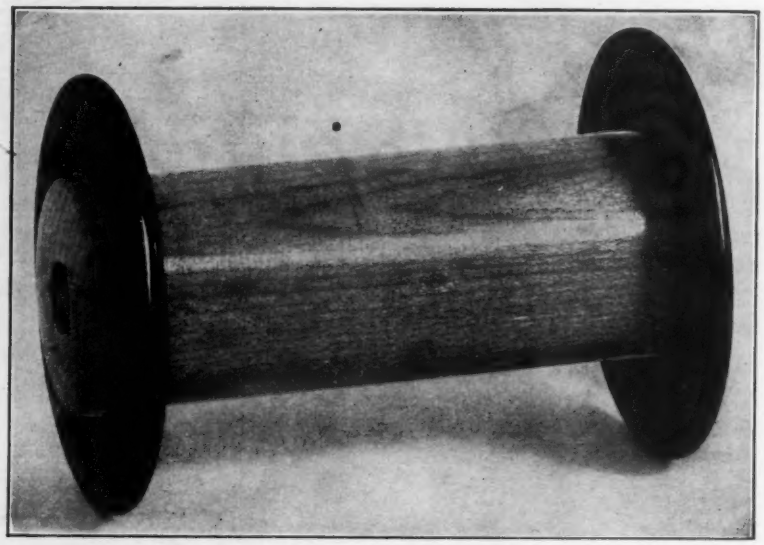
All-steel trucks would be far too heavy and cumbersome for mill use. That's why we have put a wood core between the sheets of steel on Haskins trucks. This keeps the weight down, and renders the truck easy to handle.

Send a battery of Armord Trucks into action against false economy in your mill. The years of service you'll obtain will pay many times for the the possible slight increase in first cost.

May we send you further data?

R. G. HASKINS CO.
520 W. Monroe Street, Chicago, Ill.

HASKINS ARMORD TRUCKS



Introducing—

"The S-H" Fibre Head Spool

We believe our friends in the trade will be interested to know that we have added a new department, exclusively devoted to the manufacture of an Improved Fibre Head Spool.

As all practical mill men know, the ordinary wood spool causes an enormous loss of money. Broken heads mean not only replacement but the loss of the yarn on the spool. In addition, millions and millions of yards of yarns are spoiled by splinters.

Our experts made a thorough investigation and conducted hundreds of experiments before launching this spool. It is sufficient to say that this product is up to the usual high standard maintained in every article leaving our plant.

The head of this spool is made of vulcanized hard rag fibre and is practically indestructible. These spools will soon pay for themselves.

Write for sample spool

STEEL HEDDLE MFG. CO.

Main Plant:
21st and Allegheny Ave., Philadelphia, Pa.
Southern Plant:
Steel Heddle Bldg., 817-31 E. McBee Ave., Greenville, S. C.
Branches:

Barlow & Hocknell, Huddersfield, England.
Grosvenor Bldg., Providence, R. I.
Robert Lang, Shanghai, China.

A Recognition
of Quality and Service

THE ATLANTA BILTMORE HOTEL, one of the finest hotels in the world, in keeping with the magnificent furnishings, used Warren's COATEX Paints, Enamels and Varnishes.

This recognition speaks for itself, coming from the well known Bowman Organization who operate such famous hotels as The New York Biltmore, Hotel Commodore, Hotel Ansonia, Murray Hill Hotel, Hotel Belmont, Hotel Griswold, Providence Biltmore, Sevilla Biltmore, Los Angeles Biltmore, and the Belleview at Belleair, Florida.

It is a recognition for quality paints and quality paint service of which we are justly proud, and textile mills are finding the same quality and service resulting in paint economy and satisfaction in their mill and mill villages.

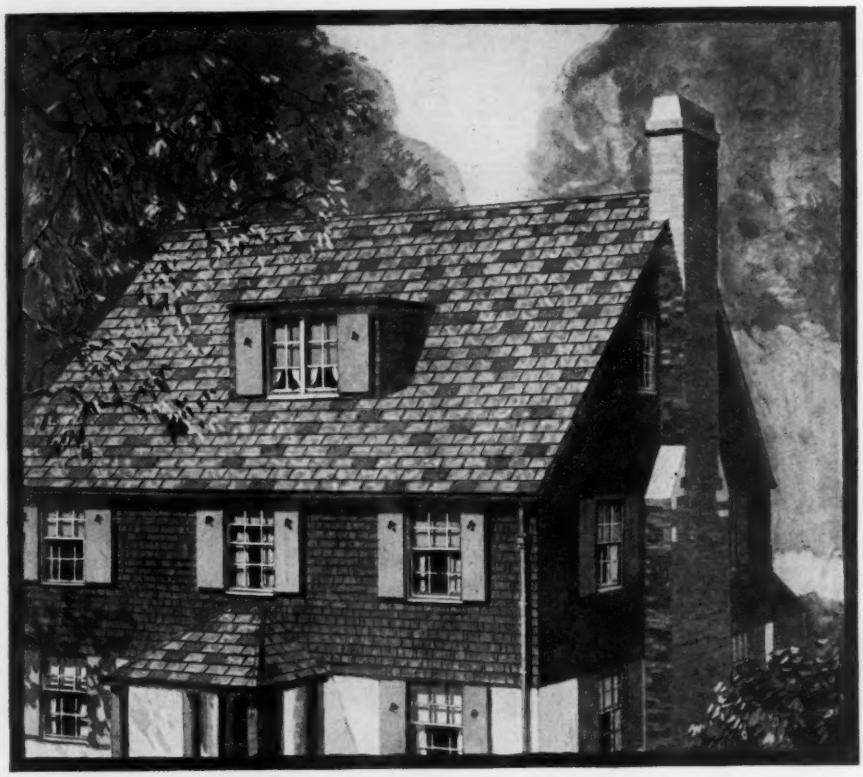
Let us submit samples for your work.
No obligation on your part whatsoever.

WARREN'S COATEX
PAINT AND VARNISH PRODUCTS

THE WARREN CO.
PAINT & GLASS DIVISION
875 E. FAIR ST.,
ATLANTA, GA.

WARREN'S
COATEX
Trade Mark

MANUFACTURERS OF
PAINT AND
POLISHED MIRRORS
JOBBERS OF PLATE
AND WINDOW GLASS



THE Richardson Multicrome Roof in Opal, shown on an English-Colonial house designed by the Home Builders' Service Bureau of House Beautiful magazine

RICHARDSON Product

From the makers of Flex-a-tile Housetops, Viskalt Membrane Roofs, Viskote, and similar products

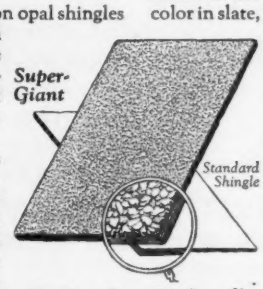
Still greater beauty for your roof

Blending colors in slate, Richardson now achieves a new effect—*opal*

A roof of rare new coloring—*opal*—has been created by blending on one shingle two of the most beautiful Richardson colors in slate, weathered brown and jade green.

No two of these Richardson opal shingles are alike. And the roof which they form just as they come from the bundle, has a coloring like that of a sun-flecked lake revealed between the trees.

Architects, home owners and builders are all enthusiastic over the distinctive color of this new opal roof. Those who have seen it agree that it is the most beautiful of the color combinations available in Richardson Multicrome Roofs.



The Super-Giant Shingle—50% thicker, 100% more rigid, and 35% more economical in cost of laying

The Richardson Multicrome Roof

In addition to opal, the Multicrome Roof is laid in other pleasing color effects. The rare *weathered brown*, an exclusive Richardson color in slate, has proved especially popular when applied in combination with other Richardson shingles of *jade green*, *tile red*, or *black pearl*. In fact, there is a Multicrome Roof to harmonize with every color scheme, and to please every customer's taste.

The new colors, opal and weathered brown, are used only on the Richardson Super-Giant Shingle—famous for its beauty and economy.

With its inner foundation of Richardson felt, for fifty years recognized as the best; coated and saturated with Viskalt, the vacuum-processed waterproofing, 99.8% pure bitumen, the Super-Giant assures you *lasting* beauty for your roof.

Richardson Multicrome Roofs are equally practical for new or over-the-old-roof jobs. And remember—for every roofing need there is a Richardson product.

Write for our new booklet

We will send you our new booklet, *Roofs of Distinction*, together with samples of Richardson Super-Giant Shingles in opal, weathered brown and other colors. Just use the coupon below.

The RICHARDSON COMPANY
Lockland (Cincinnati), Ohio

Chicago · New Orleans · Atlanta · New York City · Dallas

RICHARDSON ROOFING

© 1924, The Richardson Company

Clip and mail this coupon

The Richardson Company
Dept. 44-N, Lockland, Ohio.

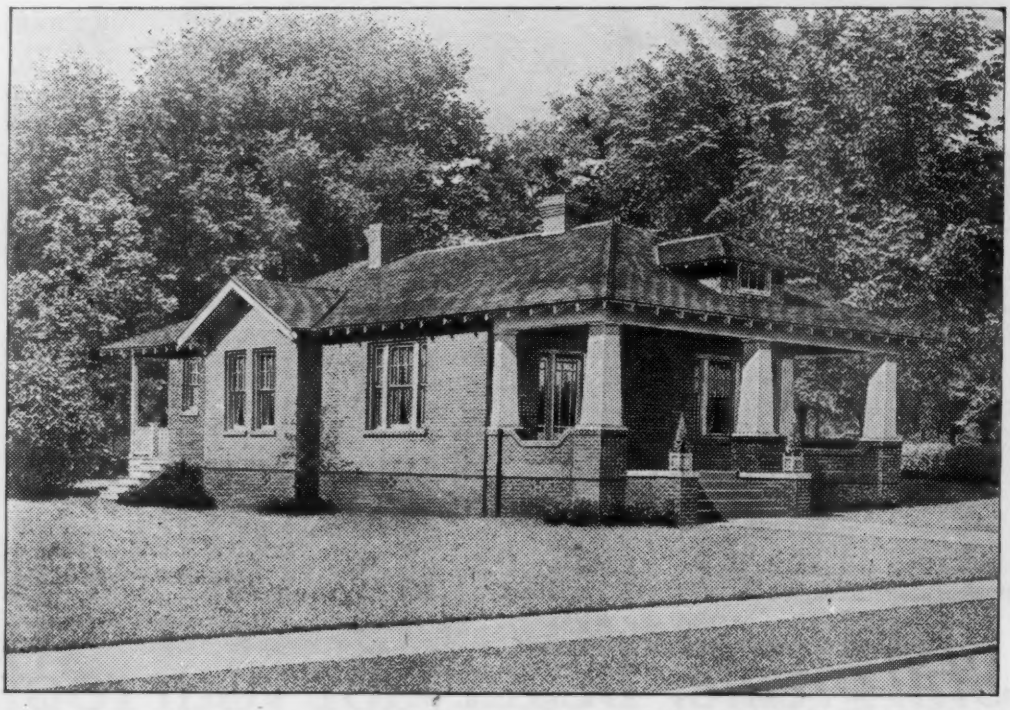
Gentlemen:

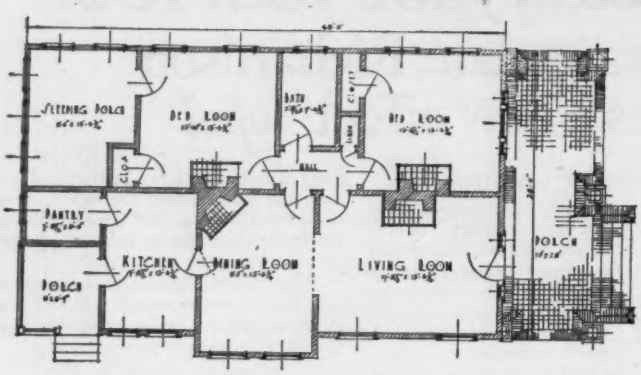
Please send me samples of Richardson Super-Giant Shingles, your new booklet, and further facts about Richardson Roofing.

Name .....

Address .....

We Handle Every Building Detail





FLOOR PLAN
of the Minter Home Illustrated Above

Type of Minter Home selected for Superintendent's Residence by a leading Textile Firm. Exterior finish of this attractive home may be either brick veneer, as shown, or in wood.

You are delivered completed homes when you place your housing in our hands. Only one contract is necessary.

No matter what your building needs may be—one and two-story community houses, churches, stores, school houses, moving picture theatres, apartment houses or other structures—you can have them erected in exact accordance with your plans or those of your architect without being troubled by any detail.

All Minter structures are built of the best materials of the kind specified, are erected in minimum time and without loss of time, labor or materials.

The Minter System is the modern method of building that saves your time, your nerves and the money of you and your stockholders.

Write us today about the houses you need.

THE MINTER HOMES CO.
GREENVILLE, SOUTH CAROLINA

MINTER HOMES CORPORATION
HUNTINGTON, WEST VIRGINIA

Send for this new book

You need not wade through an immense catalog or volumes of literature to determine the right paint for your requirements. In this book, "Degraco Paints for the Textile Industry", the information you want is condensed into twelve pages.

The recommendations in this book are not based on guesswork but on service facts gained through thirty-five years of intimate contact with the paint requirements of the textile industry.

In the final analysis, paint service is good or bad depending not alone on quality but on the suitability of this or that paint for certain surfaces and conditions.

You will find this book interesting. You will find it helpful in keeping down your per-year cost for painting and maintenance. Mail the coupon.

DEGRACO PAINTS

All Colors for Your Particular Needs

MADE BY

Detroit Graphite Company

517 Twelfth Street

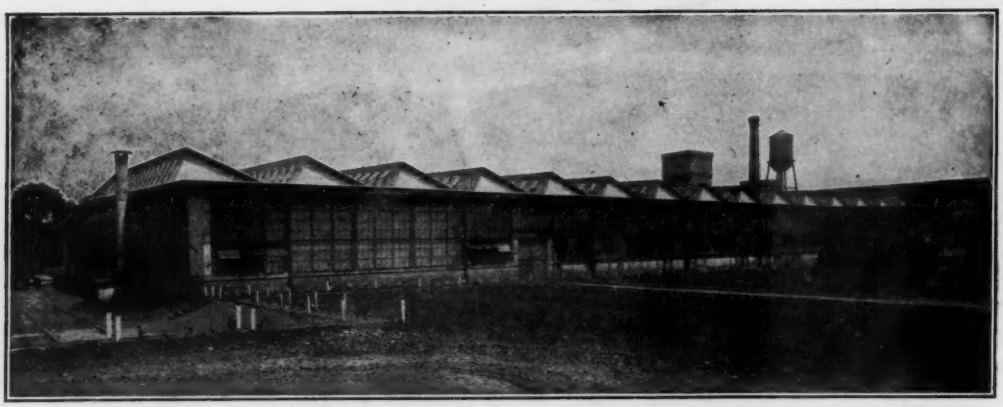
DETROIT U.S.A.

Manufactured in Canada by Dominion Paint Works, Limited, Walkerville, Canada.

DEGRACO PAINTS are sold through branch offices with warehouse stocks in all principal cities.

(231)

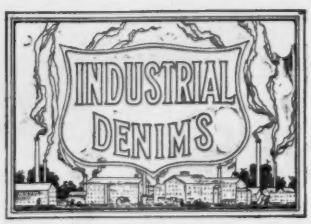
Mail copy of Book, "Degraco Paints for the Textile Industry"
to .....
Firm .....
Title .....
Address .....
Detroit Graphite Co.
517-12th St.
Detroit,
Mich.



The Industrial Cotton Mills Company of Rock Hill, S. C.

OVERALLS, the badge of labor, are worn by so many millions that it is not surprising there is a tremendous demand for blue denim.

There are varying qualities of denim. The best cotton alone will not produce the best finished goods. Every process, from blending the cotton to dyeing the yarn or cloth, is equally important in the final result. Even such factors as equipment, personnel, and management are vital influences in the standard production of uniform quality. To the co-ordination of all of these factors may be attributed the superior quality of "Industrial" blue denims.



The Industrial Cotton Mills Company's modern equipment includes 18,840 ring spindles and 1,000 looms, housed in a modern concrete weave shed with saw tooth roof and window wall construction to assure adequate light for careful workmanship.

The finish of their goods is controlled through the operation of their own dyeing and finishing department.

The Industrial Cotton Mills Company is one of the more than eight hundred clients we have served during the last quarter-century.

If you have plans for the even remote future, it will be worth your while to have a member of this organization talk them over with you. This involves no obligation. Write for an appointment.

Meanwhile, we shall be glad to send you revised editions of "Picks to the Minute"—on the textile industry—and "Factories for the Future."

J. E. SIRRINE & COMPANY

Engineers

Greenville **South Carolina**

VITRIFIED Brick PAVEMENTS

Albion Shale Brick Company
Albion, Ill.
Alton Brick Company
Alton, Ill.
Barr Clay Company
Streator, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Corry Brick & Tile Company
Corry, Pa.
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio.
Hammond Fire Brick Company
Fairmont, W. Va.
Hocking Valley Brick Company
Columbus, Ohio.
Independence Paving Brick Co.
Independence, Kans
Mack Mfg. Company
Wheeling, W. Va.
C. P. Mayer Brick Company
Bridgeville, Pa.
Medal Paving Brick Company
Cleveland, Ohio.
Metropolis Paving Brick Co.
Pittsburg, Kansas
Metropolitan Paving Brick Co
Canton, Ohio.
Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co
Murphysboro, Ill
Patton Clay Mfg. Company
Patton, Pa.
Peebles Paving Brick Company
Portsmouth, Ohio
Pittsburgh Paving Brick Company
Pittsburgh, Kansas
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Company
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.

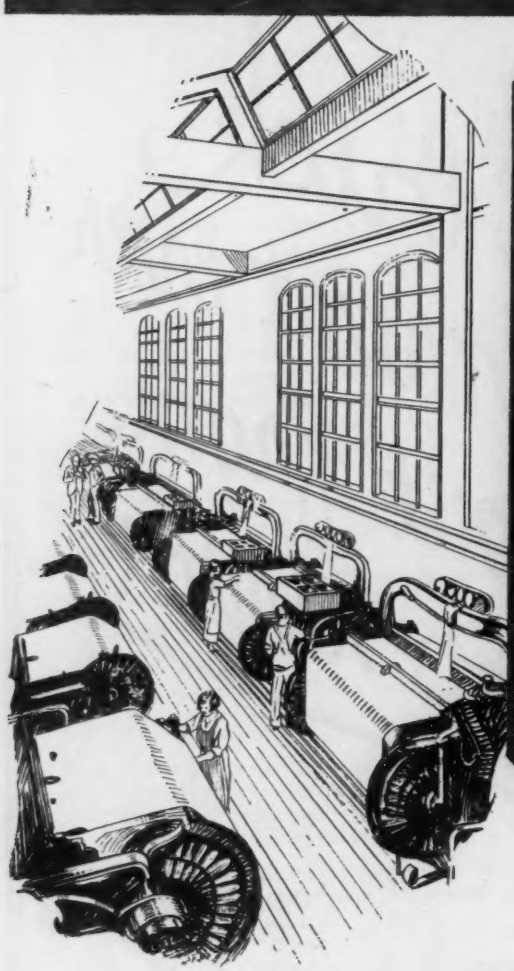
No brick pavement ever wore out from the top down

—they outlast the bonds

NATIONAL PAVING BRICK
MANUFACTURERS ASSOCIATION
ENGINEERS BUILDING CLEVELAND, OHIO

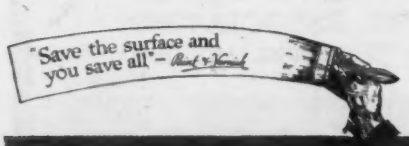
TRADE OJACO MARK

MILL WHITE



-To Make Factory Interiors STAY Whiter Longer!

OLIVER JOHNSON & Co. Inc
Makers of Paints for all Industrial Purposes
18-24 Custom House St.
Providence



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CHARLOTTE, N.C. Charlotte Supply Co.	GREENVILLE, S. C. Frank R. Henry & Co.	ROCHESTER, N. Y. E. P. Van Hosen Co.	UTICA, N. Y. American Hard Wall Plaster Co.

WOONSOCKET, R. I., Pinault & Choquette

A simple plan on a scrap of paper saved this client thousands of dollars

The plan worked. And it saved this client money. Yet the mill owners had thought it couldn't be done.

This manufacturer wrote us: "We are renting an old building in addition to our main plant, and we want to expand. Shall we renew the lease, buy the building, or build a new one? Can you advise us?"

We sent an engineer to look it over. He saw the solution of a problem that had baffled the mill owners. He went over the ground then had a meeting with the owners, in the superintendent's office. On a scrap of brown wrapping paper retrieved from the waste basket, he sketched a simple plan. It proved that this plant, part in one building and part in another, was not operating economically. He showed how, at a moderate cost, the owners could build an addition to their main plant and do away with the other building.

We were commissioned to carry out our recommendations. The main plant was enlarged, and all manufacturing processes were brought under one roof at a substantial saving in operating costs.

The completeness of Lockwood-Greene service was a revelation to these hard-headed men of business. They had been in the habit of getting along without engineering advice. They were amazed at the breadth of the Lockwood-Greene engineer's experience in every phase of mill construction and management.

We will be glad to have you write to us about your building problems. We have years of experience covering practically every branch of the textile industry, and this experience is at your service. A copy of our booklet, "Building with Foresight," will be sent on request.

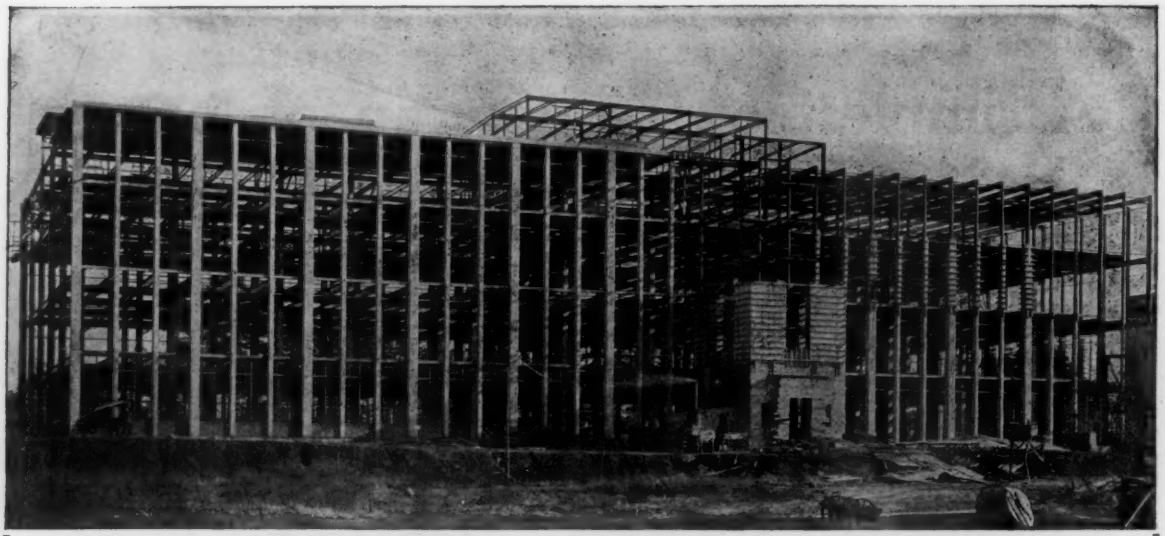
LOCKWOOD, GREENE & CO.

ENGINEERS

EXECUTIVE OFFICE, 24 Federal Street, BOSTON

BOSTON NEW YORK CHICAGO
DETROIT ATLANTA CLEVELAND CHARLOTTE SPARTANBURG

Lockwood, Greene & Co. of Canada, Limited, Montreal
Compagnie Lockwood Greene, Paris, France



COTTON MILL BUILDING TO BE EQUIPPED WITH 32,000 SPINDLES AND ACCOMPANYING LOOMS FOR PRODUCTION OF WIDE SHEETINGS.

Where concrete of utmost strength is necessary Southern builders generally use

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

The South is coming into its own as the logical location for great textile mills. Among many substantial investments made in recent years is the five million dollar operation of Pacific Mills at Lyman, S. C.

Note:

During 1923 the South used more than 1,000,000 tons of "Ensley Basic Slag" and "Alabama City Basic Slag" in concrete bridges, buildings and pavements.

FRONT OF STORE HOUSE BUILDING.
The Pacific Mills operations compose 32,000 spindle mill building, a bleachery and finishing plant 196 feet by 635 (two stories and basement); a five-story reinforced concrete storehouse and a 2,500,000 gallon-per-day filter plant.

These great monoliths of concrete—enduring, fireproof, economical—evidence the increasing use of scientifically prepared Basic Slag in concrete construction. This is due to the fact—now well established—that slag is angular, tough and porous—the cement penetrates every pore and becomes an inseparable part of the concrete. The bond is perfect, everlasting!

The photo shows two of the huge buildings that compose the Pacific Mills group, construction of which is in the hands of Parklap, Inc. of New York, contractors, and the Lockwood-Greene Co., engineers (Boston).

Birmingham Slag Co.

Slag Headquarters for the South

ATLANTA BIRMINGHAM THOMASVILLE

TEXTILE TRANSFORMATION

The 137,000 Spindle, Columbus, Ga. Plant of the Bibb Mfg. Company

DURING the last few years those who have kept in touch with industrial conditions throughout the South have seen a marked change taking place in the Southern textile field. Robert and Company are proud of the part which they have played in the rapid growth of this Important Industry.

From constant research and unceasing study of Southern conditions this organization offers a complete architectural, engineering and industrial research service of immense importance to any concern contemplating Southern development.

We invite confidential correspondence

ROBERT AND COMPANY

INCORPORATED

ARCHITECTS AND ENGINEERS ATLANTA, GEORGIA

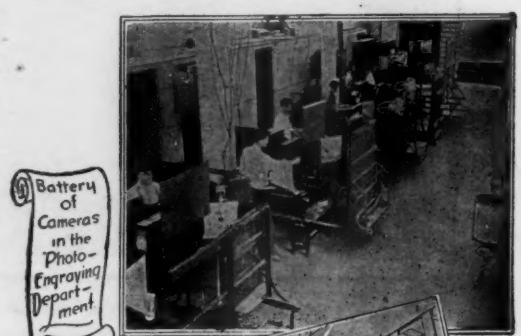
If It's A Broadside—

If it is an especially large illustration for an especially large piece of literature, chart, birds eye view, map, etc. Whether it be in one or more colors, our plant is equipped to supply your needs. No halftone or line plate too large or too small for our equipment.

Illustrating Your Literature

Sometimes in the preparation of your sales and advertising plans you find the need of some especially prepared piece of literature, the execution of which will baffle your photographer, electrotyper and printer. Frequently you may seek a service that the ordinary plant cannot give.

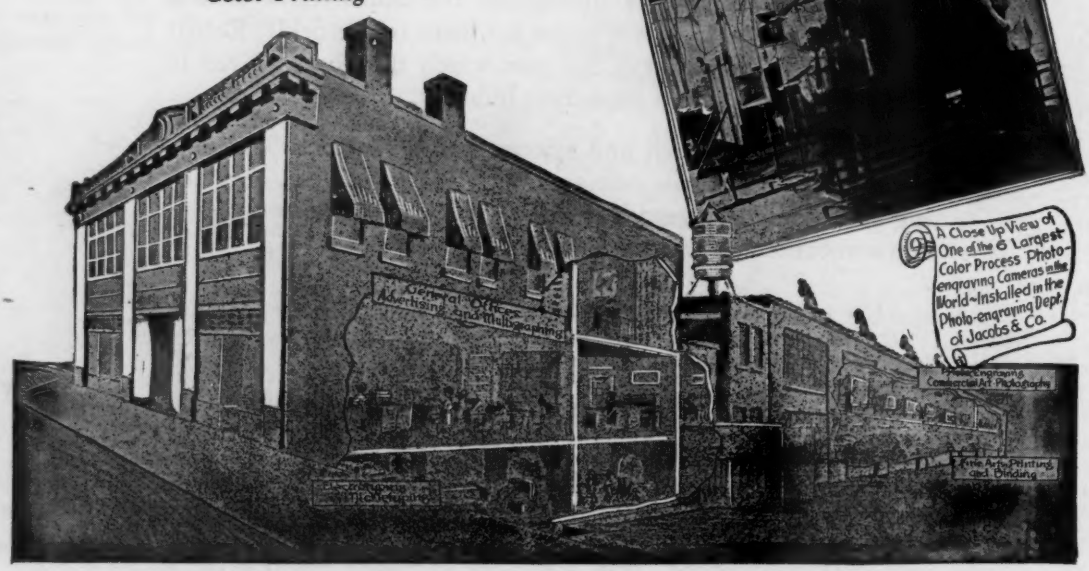
Our plant is designed and equipped for the accomplishment of many difficult products that cannot be secured from most photo-engraving establishments; is equipped to furnish the best of photo-engraving, electrotyping, printing, nickeltyping, commercial art and allied service, whether large or small, whether one or more colors. The extent of our equipment is reflected in the large process camera, which can furnish you with process color plates as large as a yard square. One of the 6 largest in the world. If you have an idea you wish carried into execution, we are at your service. We will gladly perfect it and illustrate it.



A Close Up View of One of the 6 Largest Color Process Photo-engraving Cameras in the World—Installed in the Photo-engraving Dept. of Jacobs & Co.

Jacobs & Company
Clinton, S. C.

Advertising, Commercial Art
Photo-Engraving—Electrotyping
Nickeltyping
Color Printing



Make the most of your daylight

THE BAY STATE

WAHCOLITE is the most efficient and the most economical inside mill white that you can buy. Wahcolite will not chip, crack or turn yellow.

Figured over a period of years, Wahcolite means a big saving for you. Not only from a standpoint of increased production, but in an actual saving of light. Wahcolite keeps daylight on the job more hours per day.

Let us send you complete information about this master mill white. Write today for free booklet No. 19, "Keeping in the Spotlight."

WADSWORTH, HOWLAND & CO., Inc.

Brooklyn BOSTON Jacksonville

WAHCOLITE

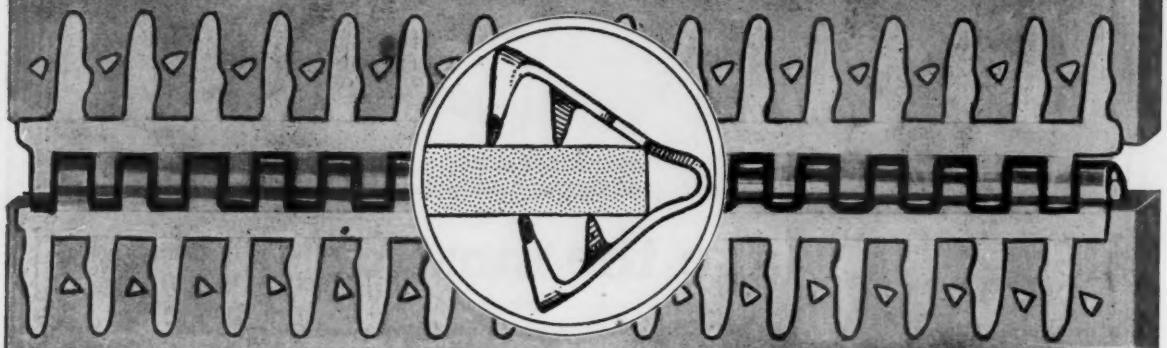
A Bay State product

BAY STATE PAINTS VARNISHES

ALLIGATOR

TRADE MARK REG. U. S. PAT. OFFICE

STEEL BELT LACING



Why Some Men's Belting Lasts Longer

The outstanding feature of Alligator Steel Belt Lacing is its method of compressing the belt end. The teeth are clinched down flush with the surface of the belt, each tooth having a vise-like grip. The belt end is protected in a grip of steel. Alligator Steel Belt Lacing is on the "approved" list of leading belting manufacturers. Men who use it learn to expect long, uninterrupted service from their belting.

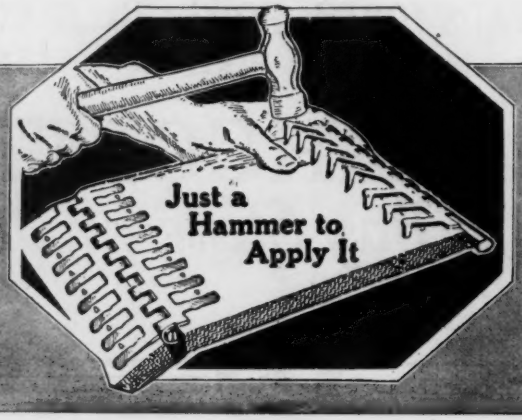
Sold by leading wholesalers and retailers the world over.

FLEXIBLE STEEL LACING CO.

4619 LEXINGTON ST. CHICAGO, ILL., U. S. A.

In England at 135 Finsbury Pave., London, E. C. 2

"Every Tooth A Vise"



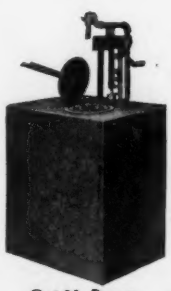
For Every Size and Kind of Belt

"That Prevents a 50% Oil Waste in Our Plant"

Cut 12. First Floor Battery Outfit with single acting, quart measuring pumps.

American Oil Storage Systems Eliminate Waste

"Yes sir! We were losing more than 50% of our various oils in this plant. Figuring the evaporation, leakage, spilling, gumming and wasted time of help our yearly oil bill was a lot more than it should be—and I didn't realize it until I put in this American Oil Storage System and found by actual test what it saved."



Cut 36, Pump with meter attached
A convenient manner for storing and serving oil into containers in exact quantities. Heavy, durable construction; discharges quart or pint at single stroke. *Ask for Bulletin* 400.

The Estimate of 50% Wastage is a Low, Average Figure

Your loss may be smaller—it may be greater! Let us tell you how you can prevent the loss and how soon the savings you will make will pay for an American System adapted to your special requirements. We will gladly give you this information without cost or obligation.

The American System insures cleanliness and convenience, saves time of help and customers and gives cleaner, better oil. Write us the extent of your oil needs and let us submit details of a suitable installation and its cost.

Ask for Bulletin 203—it tells how you can reduce your lubricating oil bill.

The American Oil Pump & Tank Co.

1179 FINDLAY STREET, CINCINNATI, OHIO

Quotations Furnished on Special Oil Tanks for Holding Any Quantity From 100 Gallons to Car Load

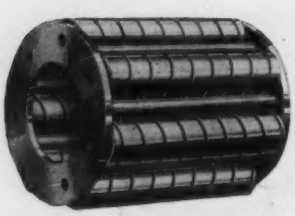
Increased Production From Your Cards

Easy Starting — Hyatt equipped card cylinders start so much more easily than plain bearing cylinders that the time required to bring a battery of cards up to speed can be cut in half. In addition, lower starting torque reduces belt slippage and wear.

Accurate — Because Hyatt bearings retain their accuracy indefinitely, resetting of the cylinders and licker-in is necessary only when the clothing must be reground. This insures continuous production of clean, uniform sliver.

Durable — For the same reason production losses due to renewing bushings or truing up worn shafts are entirely prevented with Hyatt roller bearings.

Clean — Properly mounted, Hyatt bearings are oil-tight, which reduces the amount of spoilage, since damage due to oil leakage is completely eliminated.



You can secure these and other advantages by specifying Hyatt roller bearings on your cards.

HYATT ROLLER BEARING COMPANY

NEWARK DETROIT CHICAGO SAN FRANCISCO
HUNTINGTON PHILADELPHIA PITTSBURGH MINNEAPOLIS
WORCESTER BUFFALO CLEVELAND MILWAUKEE

Handy, but Absolutely Safe

This picture shows a departmental oil supply station in the Woodside Mills, Greenville, S. C.

It is not an unusual picture, or an unusual installation—but a fine example of careful planning in making the oil thoroughly convenient, yet wholly safe.

Bowser storage systems provide whatever is needed for each individual mill, but use the standard units to do it, thus saving money and insuring reliability.

Bowser experience will show you, too, how to have oil where you want it, when you want it, and all you want of it. Booklet 45 tells the entire story, and is yours for the asking.

S.F.BOWSER & COMPANY, Inc.

Dependable Pumps and Tanks

FORT WAYNE, INDIANA, U.S.A.

Sales and Service Representatives All Over The World

You Can't Beat It For Simplicity

Look at this box. See how easy it is to assemble.

You will notice the box is split. First you put the upper half of the box on the shaft, then slide the lower half into place. Then they are screwed together.

The rollers operate on the shaft. There are no collars, no bushings—nothing to give trouble.

It is this simplicity that makes the Hyatt lineshaft box trouble-proof. Oil every four months is absolutely all it needs. Its rugged simplicity insures you against wear and delays in production.

We have a book of information for you. Its number is 130. Send for it today.

'Phone the Nearest Mill Supply Dealer

HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY
PACIFIC COAST ADDRESS: SAN FRANCISCO, CAL.

Strom BALL BEARINGS

An Old Company — a New Name

The trade-mark and the product haven't changed —only the Company name is different

IN the future—Strom Ball Bearings will be manufactured by the Strom Ball Bearing Manufacturing Company. Thus the product, and the company that makes it, will have the same name.

The name "STROM" on a ball bearing is an asset.

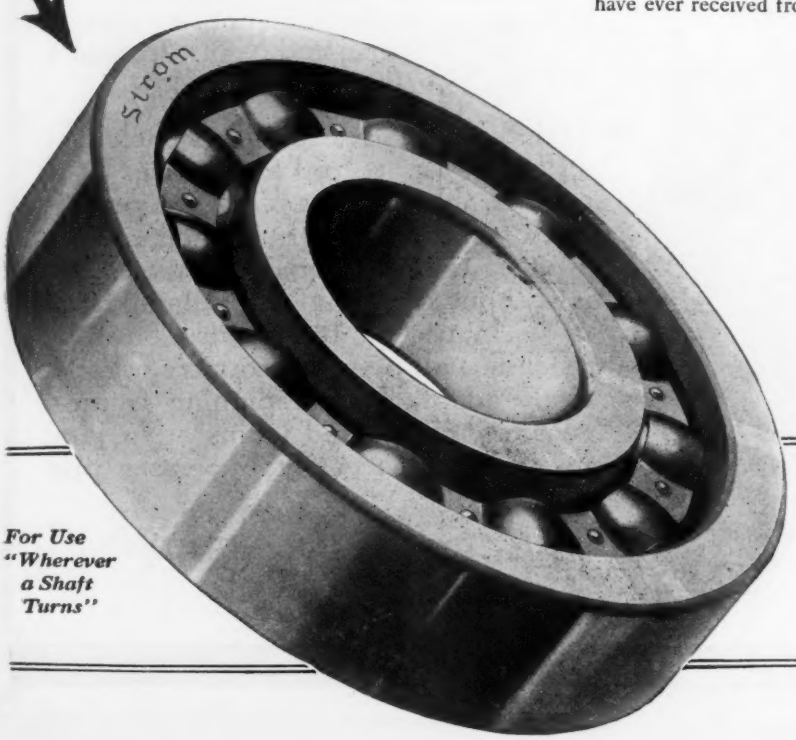
It is the trade-mark of a superior product, made in a superior way.

So we decided to change the name of our corporation to embody this valued trade name.

No changes have been made in the company personnel. The high manufacturing principles which have governed this concern's business will remain the same.

Strom Ball Bearings will still be made with that exact scientific precision and that devotion to perfection for which they have been noted in the past.

Our service will keep on improving, as it has improved in the past. And we ask for our company a continuation of the same kind and generous consideration which we have ever received from the trade.



Our engineers are at your service. Consult them freely.

Our ample stocks are ready to meet any emergency calls. Strom Ball Bearings are made in a wide range of sizes and styles, ready to meet your requirements.

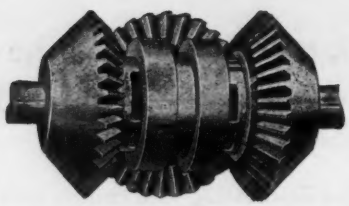
For Use "Wherever a Shaft Turns"

Strom Ball Bearing Mfg. Co.
(Formerly U. S. Ball Bearing Mfg. Co.)
4544 Palmer St., Chicago, Ill.

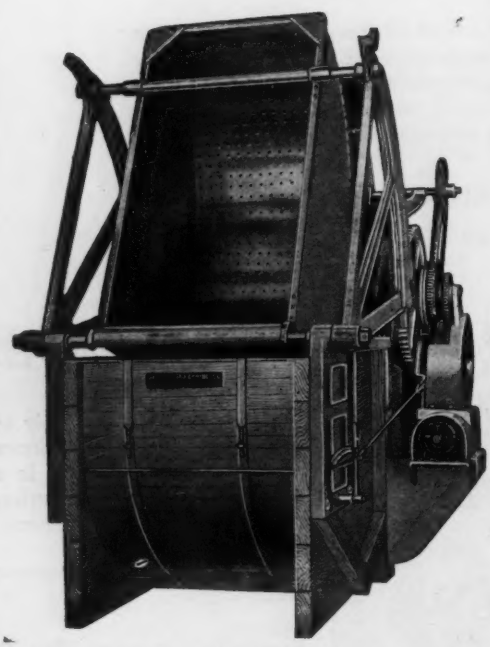
THE JOHNSON FRICTION CLUTCH

as used in the

New Berks Paddlewheel Dyeing Machine



Johnson double clutch between bevel gearing.



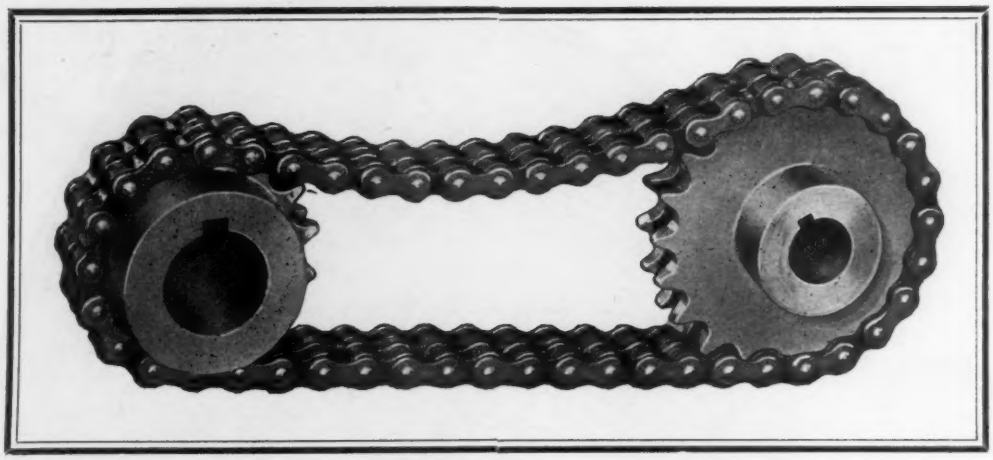
Courtesy: Berks Engineering Co., Reading, Penna.

A NO. 5 Johnson Double Clutch is used in this installation. End View of Motor shown on right hand side of cut. Clutch is connected to motor on far side and drives through spur gears to the machine, to give a Forward, Reverse and Neutral. Speed of Clutch, 1200 R.P.M.

THE JOHNSON Clutch has back of it a twenty-year record for service. It is a clutch that stands up. It is a powerful, compact, smooth-running clutch, built particularly for light power, and is without an equal for textile machinery. In use on thousands of textile machines all over the country. Especially adaptable for spinning frames, twisters, cards, and looms. No jars; no jerks; runs easily; increases production.

WRITE TODAY FOR CATALOG "C"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



DIAMOND High Speed Roller Chains

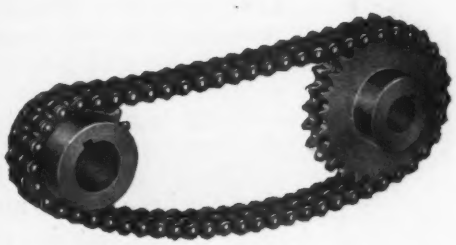
for Motor Drives and Textile Machinery

DIAMOND Roller Chains and Sprockets make ideal power transmission units for drives from electric motors to machines, and for auxiliary drives on a wide range of textile machinery.

Years of service in many important industries have demonstrated that these drives are well adapted to high speeds and heavy loads, and will operate successfully under severe conditions.

They transmit power positively, flexibly and efficiently, run smoothly and quietly and operate on short centers—saving valuable space. Their long life, with practically no up-keep expense beyond lubrication, reduces the yearly cost of each drive to a low figure.

If you have a power transmission problem of any kind, send us your specifications and let our engineers recommend the correct drive for your conditions. You will incur no obligation and we may be able to save you considerable money.



DIAMOND CHAIN & MFG. CO. Indianapolis, U.S.A.

Makers of High Grade TRADE MARK *Chains Since 1890*

DIAMOND Roller Chains

Catalog and Data Sheets

Every mill executive should have these on file. You'll find them of real help. Write us for copies.

COCHECO BELTING

Cocheco Belting Has a Remarkable Service Record

No matter where you use it, you'll find you cannot buy more efficient, economical or durable power delivery than Cocheco service offers you.

Cocheco serves and saves wherever it is used. Its sturdy quality and reliability is achieved by combining expert workmanship and finest leather. It is the result of 80 years of study and of constant effort to produce, not merely a good belt, but a super belt, for exceptional service.

In these modern days of high cost power and labor it is not the first cost of belt which counts but the perfect transmission of power, without loss from slippage and the continuous operation, without loss of labor. It is in this way that Cocheco serves and saves.

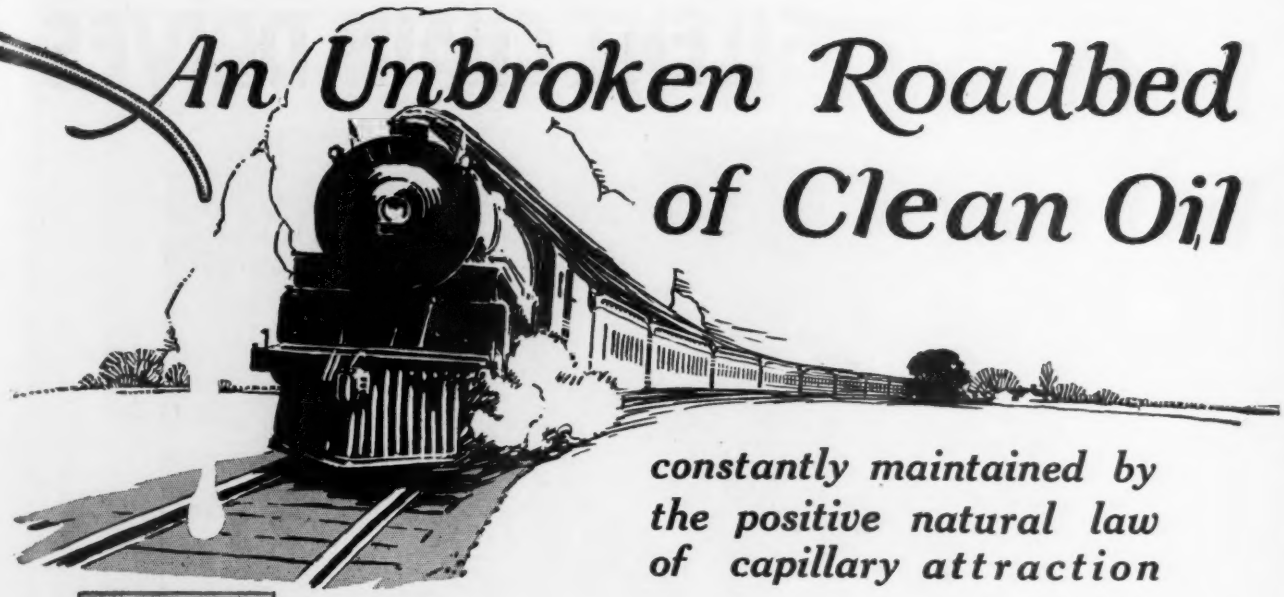
Cocheco Belting costs less per horsepower, per day of service. Let us tell you why.

I. B. WILLIAMS & SONS

DOVER, NEW HAMPSHIRE, U. S. A.

BOSTON, MASS., 157 Summer St.
NEW YORK, N. Y., 71-73 Murray St.
CHICAGO, ILL., 14-16 N. Franklin St.

An Unbroken Roadbed of Clean Oil



constantly maintained by the positive natural law of capillary attraction

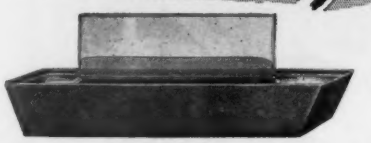
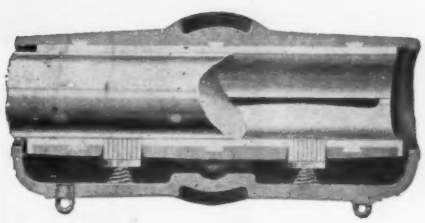


Fig. 1. Photograph illustrating capillary attraction between two glass plates standing parrallel in oil. As shown, the oil has risen between the plates to a height above the surface of the oil in the tray proportionate to the distance between the plates.



Oil from the reservoir of the Dodge Capillary Bearing rises to the shaft through the alternate saw cuts in the wooden blocks by capillary attraction.

Fig. 2. Same plates as shown in Fig. 1, made to touch at their right hand ends only. Oil has risen to the tops of plates at points of contact. These plates are in the same relative position as the surface of a Dodge Capillary Bearing.

A continuous, uniform and unbroken film of oil is constantly maintained between shaft and bearing liner preventing bare contact of metals which means friction and loss of power.

The Capillary Oiler is automatic in operation and requires practically no attention aside from draining and refilling every six months. It is non-agitating and only clean oil is supplied to the shaft.

Depreciation is negligible — these bearings will be as efficient and serviceable after twenty years or more as when originally installed.

Buy Dodge Capillary Oiling Hangers and Pillow Blocks from your local dealer on the immediate delivery basis.

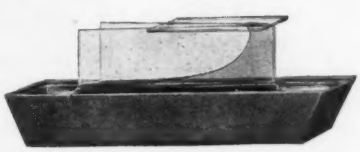


Fig. 3. To represent the shaft in a capillary bearing, a strip of glass has been laid on top of the two plates. Note the increased raise of oil in its endeavor to cover the top plate. It has the same tendency to cling to the shaft in a bearing.

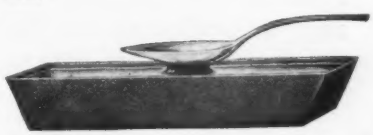


Fig. 4. A spoon supported one-eighth of an inch above the surface of the oil was depressed to touch the oil and was then allowed to spring back to its original position—the oil followed as shown. This same action takes place when the level of the oil gets below the bottom of a Dodge Capillary Bearing.

DODGE MANUFACTURING CORPORATION

General Offices: MISHAWAKA, INDIANA
Works: MISHAWAKA, INDIANA, and ONEIDA, N. Y.

EVERYTHING FOR THE MECHANICAL TRANSMISSION OF

Branches: New York Philadelphia Pittsburgh Boston Cincinnati Newark Chicago
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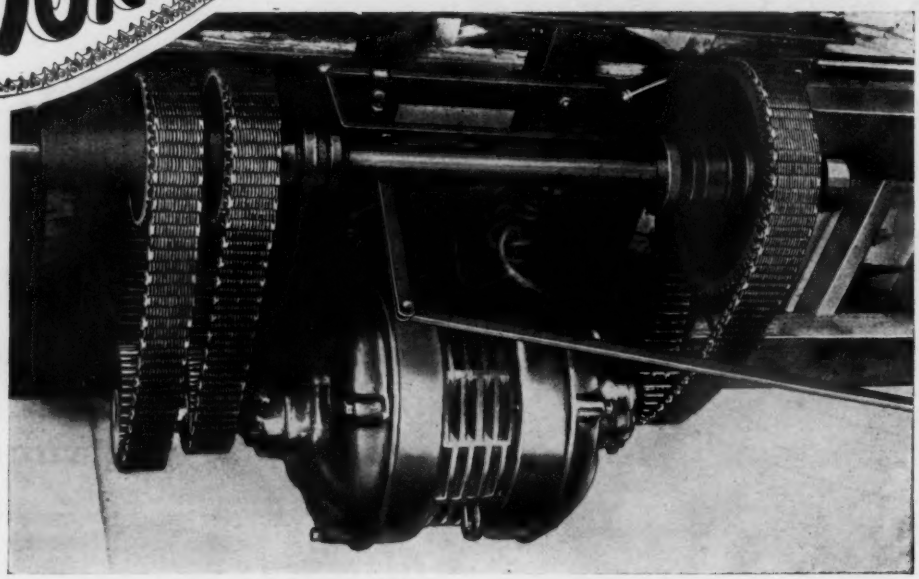
Power

MORSE SILENT CHAIN DRIVES



Lineshaft Drive equipped with Morse Silent Chains

Use Morse Silent Chains for *that* difficult drive

Morse Silent Chain Drives will, in a large number of instances, solve the problem of many difficult transmission drives.

Wherever they are installed, the users are securing 98.6% transmission efficiency from the driving unit. The number of Morse Chain Drive installations is constantly growing, due primarily to this important feature.

Add to this, flexibility—quietness and smoothness in running—low up-keep—(only occasional lubrication)—the minimum of repairs—no stretching—no slippage, and you have the ideal power transmission, secured by the use of Morse Silent Chains.

Another big advantage appreciated by Morse Chain users is that Morse Chains permit the use of unusually short centers. Let Morse Engineers look over your plant and suggest where these 98.6% power transmitters will help you toward better profit.

MORSE CHAIN CO., ITHACA, N. Y

There is a Morse Engineer near you

ATLANTA, GA...702 Candler Bldg., Earl F. Scott & Co
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTON, MASS.....141 Milk St.
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Room 803, 112 West Adams St.
CLEVELAND, OHIO.....421 Engineers Bldg.
DENVER, COLO.....1761 Wazee Street, R. M. Parsons
DETROIT, MICH.....7601 Central Avenue
KANSAS CITY, MO.....Finance Bldg., Morse Eng. Co.
NEW YORK CITY.....Room 1871, 50 Church St.
MINNEAPOLIS, MINN. 412 Third Street, S., Strong-Scott Mfg. Co.
MONTREAL, CAN. St. Nicholas Bldg., Jones & Glassco, Reg'd
PHILADELPHIA, PA. .....612 Franklin Trust Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
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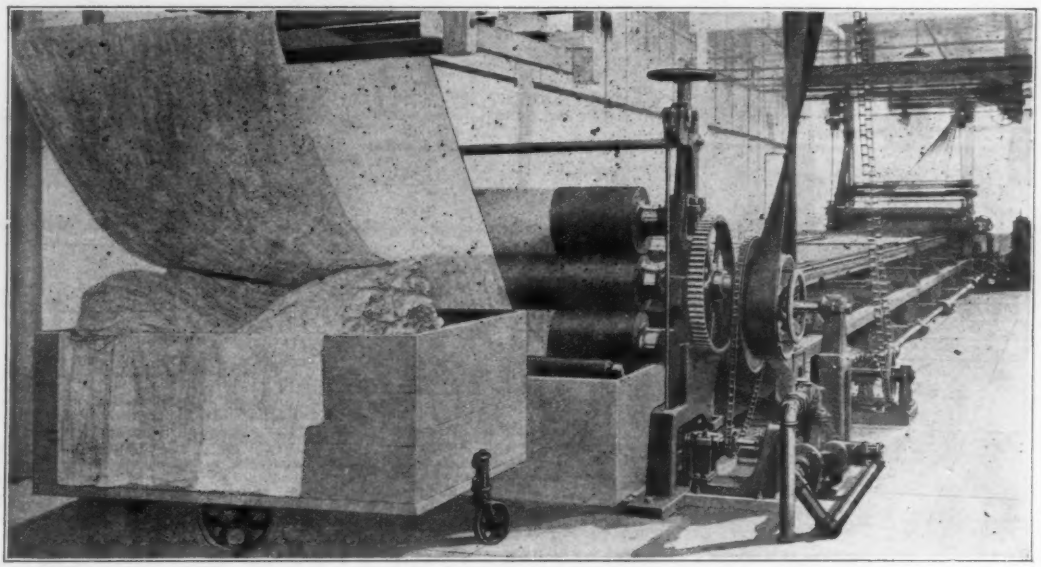


"Should we mercerize our product?"

This question is one which we would like to help many cotton goods manufacturers settle.

There is no doubt that consumers are paying more and more attention to the wearing qualities of fabric. This applies alike to goods already made up as well as those purchased in the piece. And there is no doubt either that mercerization does add upwards of 20 per cent to the strength and wearability of any fabric.

This alone has influenced many manufacturers to mercerize their product, just as it is influencing consumers to demand that mercerized product.

Now the question is, "Should **you** mercerize **your** product?"

Our organization which dates back more than 104 years is at your service in this or any other question pertaining to the finishing of textiles.

H. W. BUTTERWORTH & SONS CO.

Established 1820

PHILADELPHIA, PA.

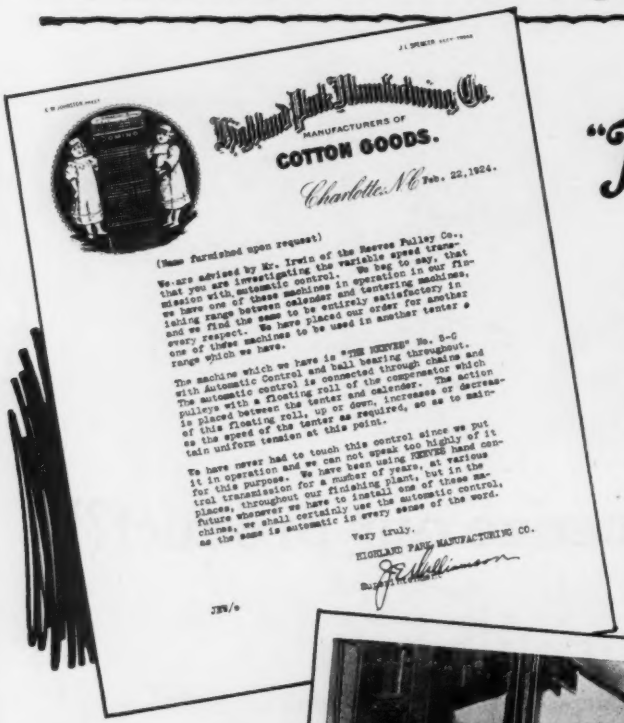
Canadian Representative:
W. J. Westaway Company
Hamilton, Ontario, Canada

Providence Office:
Turk's Head Building

Greenville Office:
Woodside Building

BUTTERWORTH *Finishing* MACHINERY

"-is automatic in every sense of the word."



Highland Park Manufacturing Co.
MANUFACTURERS OF
COTTON GOODS.
Charlotte, N. C. Feb. 22, 1924.

(Name furnished upon request)

We are advised by Mr. Irwin of the Reeves Pulley Co., that you are investigating the variable speed transmission with automatic control. We beg to say, that we have one of these machines in operation in our finishing range between calender and tentering machines, and we find the same to be entirely satisfactory in every respect. We have placed our order for another one of these machines to be used in another tenter of range which we have.

The machine which we have is "THE REEVES" No. 5-G with Automatic Control and ball bearing throughout. The automatic control is connected through chains and pulleys with a floating roll of the compensator which is placed between the tenter and calender. The action of this floating roll, up or down, increases or decreases the speed of the tenter as required, so as to maintain uniform tension at this point.

We have never had to touch this control since we put it in operation and we can not speak too highly of it for this purpose. We have been using REEVES hand control transmission for a number of years, at various places, throughout our finishing plant, but in the future wherever we have to install one of these machines, we shall certainly use the automatic control, as the same is automatic in every sense of the word.

Very truly,
HIGHLAND PARK MANUFACTURING CO.
J. E. Williamson
Superintendent.

JEW/o

"The Reeves" Automatic Control

has brought about a wonderful advancement in the method of finishing cloth in textile mills. It makes possible the range system of cloth finishing.

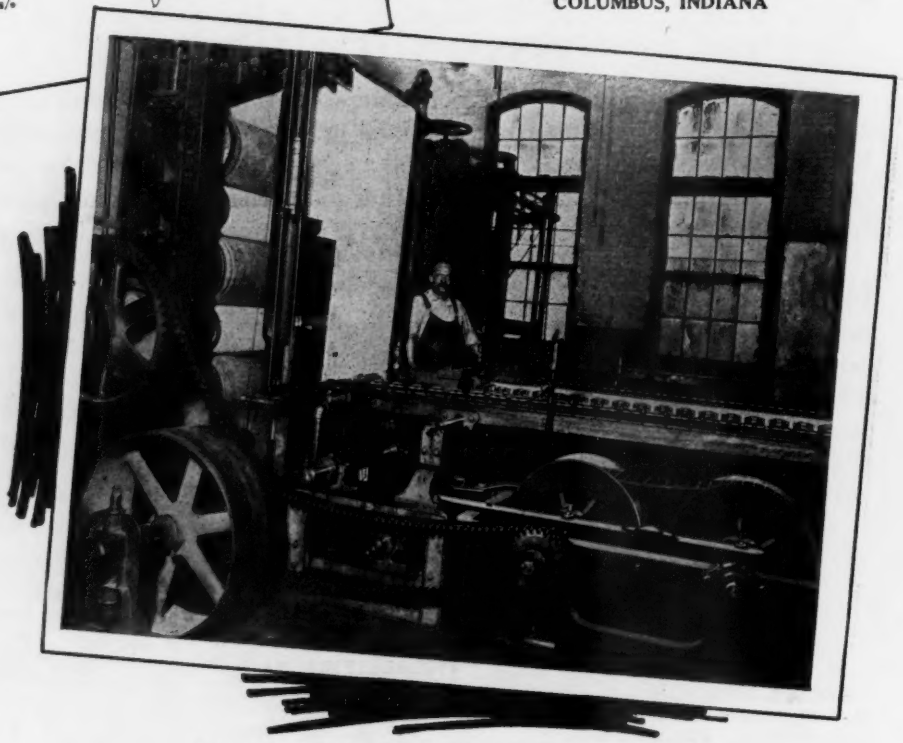
"The Reeves" Automatic Control is ABSOLUTELY AUTOMATIC in that when once connected it never has to be touched or watched—never gets out of adjustment or balance, never fails to operate, always keeps the tension of the cloth uniform. It is so positive in its automatic regulation that there is absolutely no "hunting" whatever of the floating roll—it moves to its proper position and there it stops.

When the speed of the "master" or hand controlled machine in the range is varied, all other machines automatically vary with it and simultaneously holds the tension on the fabric uniform.

Is extremely simple, durable and reliable. Very inexpensive and easily installed. No electrical apparatus or complicated switches to get out of order. It is absolutely foolproof.

Write for Automatic Control Bulletin, C-2055.

REEVES PULLEY COMPANY
COLUMBUS, INDIANA



No. 5-G REEVES Variable Speed Transmission with Automatic Control operating 90" Tentering machine through Morse chain connection. The Transmission automatically controls the speed of the tenter and keeps the tension of the cloth uniform between tenter and calender. Speeds 40 to 80 yards per minute.

Entire line of machines furnished by H. G. Mayer, Southern Representative of Textile Finishing Machinery Co., Charlotte, N. C.

Fletcher Underdriven Extractors

Fletcher Electric Underdriven Hydro Extractors combine unusual safety, economy, durability, cleanliness, simplicity, accessibility and ease of control.

Wherever installed these Extractors have done more and better work at a lower cost than any others previously used.

If you are contemplating replacing your old extractors, let us prove to you why you need FLETCHER EXTRACTORS. A postal will bring complete information and catalog.

FLETCHER WORKS

INCORPORATED

Formerly SCHAUM & UHLINGER

Glenwood Avenue at Second Street : : : : : : : Philadelphia, U. S. A.

DURABLE K-W UNIVERSALLY USED

K-W has proved its worth!

After half a century of hard use in many mills Klauder-Weldon Dyeing, Bleaching and Scouring Machinery is still in good condition and operating better than new machinery of other makes.

There could be no greater proof than this of the quality which is built into every K-W machine that leaves our plant.

The ever increasing number of textile men who insist upon K-W Machines for their mills is ample proof of the efficiency and dependability of our newest models.

Without cost to you our engineers will gladly assist in solving any finishing problem in your mill. Send for illustrated catalog today.

THE KLAUDER-WELDON DYEING MACHINE CO.

BETHAYRES, PA., U. S. A.

"The World's Best"

Dyeing—Bleaching—Scouring Machinery

H. G. Mayer, Southern Agent, Realty Bldg., Charlotte, N. C.

DIASTAFOR

An Important Message to the Textiler

DIASTAFOR is a Money-Maker for You. It will improve the quality of your fabrics and increase your Sales.

DIASTAFOR is the safest and most reliable "de-sizing" agent for use in connection with the Dyeing, Bleaching, Mercerizing and Finishing of Cotton and Mixed Goods.

In the processing of piece goods, DIASTAFOR quickly and effectively removes all starchy materials by converting the starch into sugar which is readily dissolved and washed out.

The use of DIASTAFOR is simple and easy. It may be readily employed by the "non-technical" man.

DIASTAFOR eliminates the danger of tendering which is so likely to result from the use of acids.

DIASTAFOR imparts a full soft handle to the fabric, results in a closely adherent finish and at the same time materially reduces the tendency to shrinkage.

DIASTAFOR substantially reduces the amount of caustic normally used in the kier and results in a much cleaner kier liquor.

DIASTAFOR

"Standardized and Reliable —— Can Always Be Depended Upon"

Give DIASTAFOR a trial. Write to us for full particulars.

THE FLEISCHMANN COMPANY

695 Washington St. Diastafor Dept. New York, N. Y.

DIASTAFOR WAREHOUSES

BOSTON, MASS. CINCINNATI, OHIO NEW YORK, N. Y. PHILADELPHIA, PA.

Representative: MR. HOWARD L. JENKINS

Hydroxy Art Silk Coning Oil

A Specially Prepared Oil

Used in the Coning, Winding, and Knitting of Artific .l Silk

Makes Artificial Silk Knit Smoothly.
Eliminates Breakdowns. Reduces Seconds.
Washes out easily at low temperature.

Therefore—
Dyeing and Bleaching is even and shades brighter.

Sample sent on request—no charge.

Developene (There Is no "Just as Good")

Makes a rusty Black stocking turn deep Black.

Kali Chlorine Neutralizer

An Anti-chlor—prevents tender bleached goods.

All chemicals for the Dye House—
All oils—Sulphonated—Turkey Red—
Neatsfoot, Olive, etc.

KALI MANUFACTURING CO.

1410 No. Front St., Philadelphia, Pa.

Sole Manufacturers of "Hydroxy Oils" Patented.

Staley's

Expert Staley Service has improved quality and reduced cost in thousands of textile products.

First, a detailed analysis is made of individual mill conditions and manufacturing requirements. Second, a special starch is compounded for each particular need.

Scientific laboratory facilities, and the most advanced production methods assure absolute maintenance of original specifications in each starch employed.

You, too, can benefit by the application of scientific Staley methods. A member of our consulting staff will be glad to call.

A. E. STALEY MFG. CO.
DECATUR, ILLINOIS

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Spartanburg, S. C.
G. A. Dean, Manager.

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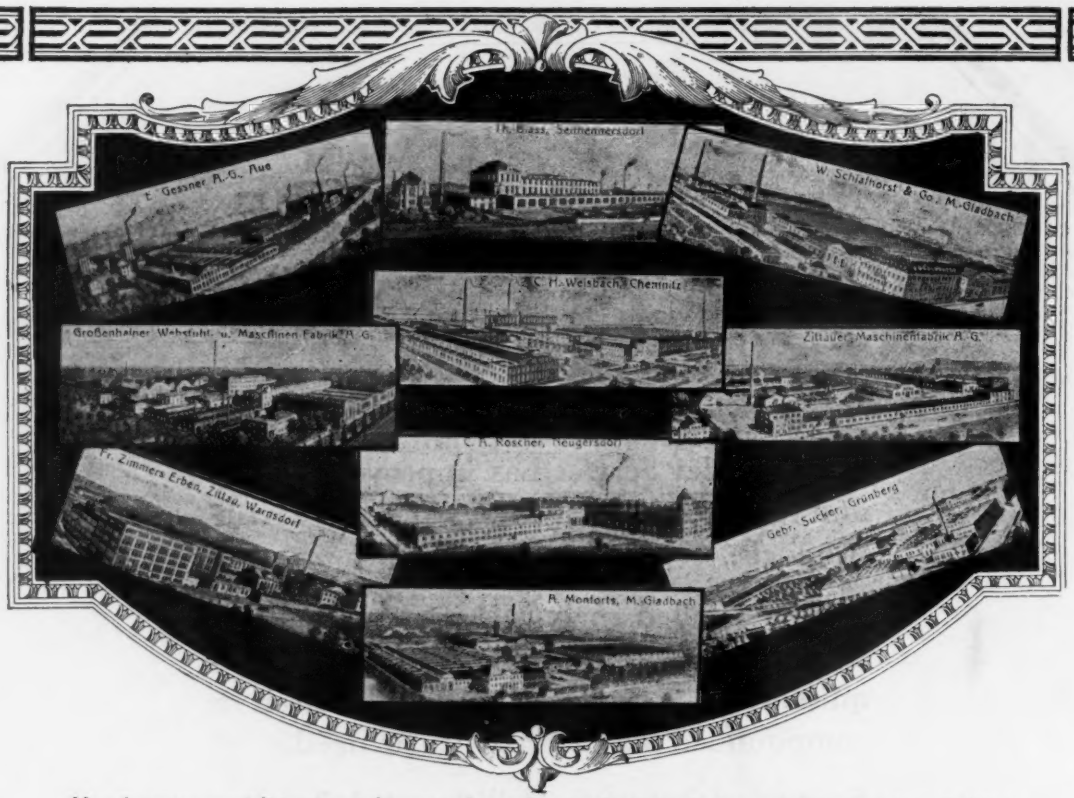
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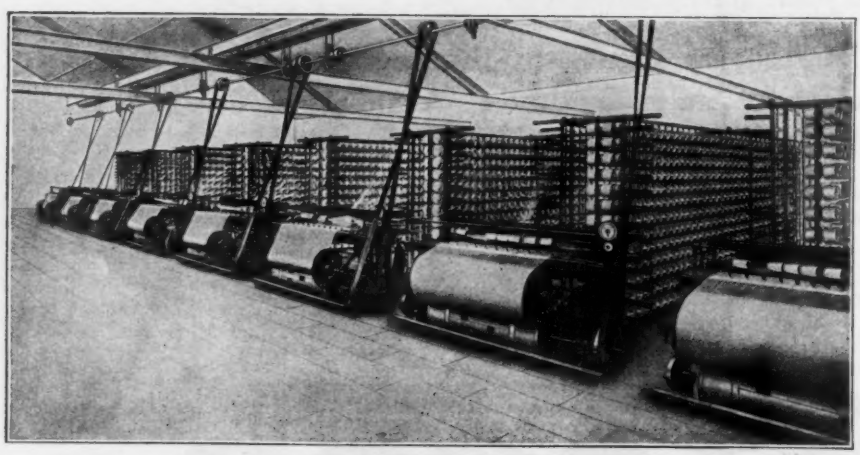

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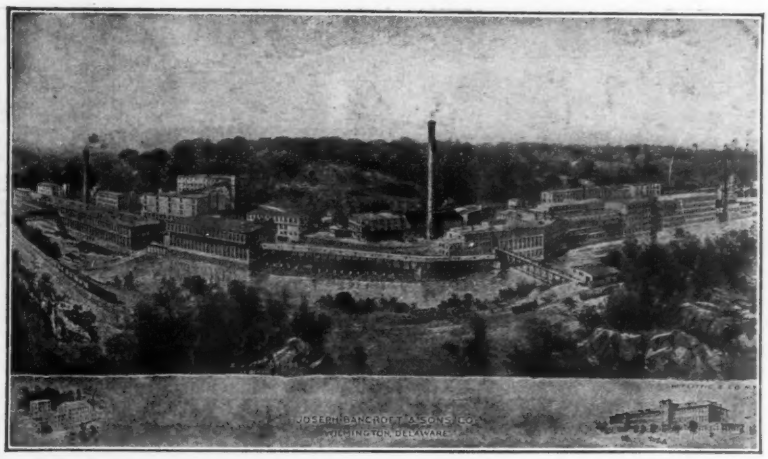

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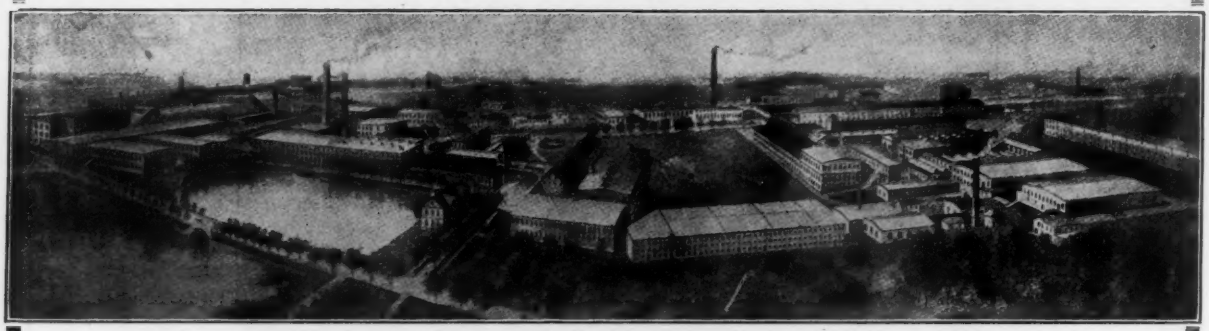

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With the Publishers—

A "Hump Yard" for Textile Information.

A cotton mill executive, in addressing a group meeting, was describing the interesting operations in a "hump yard" for switching railroad cars. He told how long trains of cars were brought from all parts of the country to a railroad center. Here they were pushed over the top of the "hump" and allowed to roll down the incline, being released one at a time, moving down through the yards where switchmen threw the levers which shunted each car to its proper track where it formed part of a train destined for some certain section of the country. After the train was made up an engine came along and hooked onto it and hauled it to its terminus.

"This is a great deal like the work done by COTTON," he added. "From all over the country come loads of ideas and information about successful practices and policies in the textile industry. Here is a lot of good suggestions from a mill superintendent who has solved a difficult problem in production. There is another lot consisting of experiences from a man who had found he was losing by not having the proper equipment.

"All these lots of valuable information for textile men come rolling into the clearing yard of COTTON. These trains of thought are pushed to the top of the incline and the editors of COTTON, acting as switchmen, shunt them on the proper track or into the different departments of the paper. All then that the mill superintendent has to do is to hitch his engine, so to speak, onto one of these newly-made-up trains of thought and take it right up to his own plant and unload the valuable material."

This mill man was right. Also, he might have added that just as no train can move over the road and keep its schedule without proper equipment, so is the mill that is not properly equipped unable to keep to schedule and move over the road to profits. Equipment described in the advertising pages of COTTON should be coupled into every train of thought. This equipment is designed for "on time" movements and for long heavy pulls.

Month after month long loads of ideas are rolling into the COTTON clearing yards. Once each month the financial and operating executives of mills everywhere are attaching their own motive power to these trains of thought made up on the track ready for them and are moving on surely toward their destination—productive and financial success. It isn't the ideas that do the trick; it's the application of those ideas. A bright future lies ahead of the men with the ability to select the ideas and opinions of other men and adapt them for practical and successful use in their own mills. Like the modern railroad in the mill man's simile, COTTON switches trains of thought in the right direction and it depends entirely on the individual efforts of the man as to how much of this material he is able to unload or apply after the suggestions reach him.

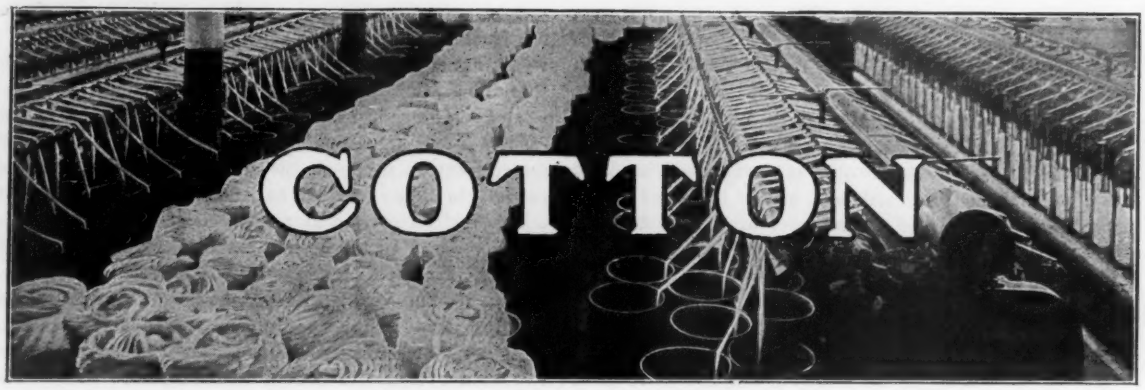
"Scientific Trends with a Textile Slant" is the title of some thought provoking comments that are beginning in this number.

AMONG COTTON'S READERS

Milton Ensor,
Superintendent, Adrian and Madora Mills
American Yarn and Processing Company
Mount Holly, North Carolina

"The contents of COTTON are always interesting to me. Its pages are a source of wide and interesting information."

Milton Ensor



May, Nineteen-Twenty-Four

Again the Merchant Marine.

Two committees, made up in part of business men, and named by the President have been investigating the merchant marine and foreign shipping situation. A Congressional committee has begun what is proposed to be an extended inquiry into the work of the Shipping Board and into the merchant marine problem generally. The Shipping Board recently made important changes in fundamental policy, with the hope of making a better showing in future than in the past.

Thus stands the merchant marine problem as it has stood largely for three-quarters of a century, besplattered with talk, forked over and over by investigating agencies, a constant changing of governmental if not national attitude towards it. Meantime we get virtually no nearer to the possession of a real merchant marine than we were between, say, 1900 and 1914, when the American flag was almost unknown in foreign ports.

We have ships, the leftovers of one of the most spectacular and costly war episodes in all history. During the war and the first two years thereafter the Government, functioning through the Shipping Board, built nearly 2,500 ships. We broke all world records both in speed and volume of production.

This, of course, was mainly a war making venture. However, it should not be forgotten that only a few of our ships were used during the war. Most of them were completed, the construction of a majority of them even was started, after the war ended.

Hence it is not quite fair or honest to dismiss the subject with the claim that our shipping program was designed to win the war, and that money spent upon it should be dismissed as a war expenditure as was the sum spent on munitions.

While the winning of the war was the prime end aimed at both in shipbuilding and everything else when the war was on, the practically $4,000,000,000 of public funds which has been spent on ocean shipping was largely for the development of a secure merchant marine for peacetime use. This is a fact, no matter how established, by circumstances or expressed intent.

And yet what are the results. A lot of ships, a great many of which are not such as fit easily or successfully into the merchant marine scheme of things; ships that it is all but impossible to sell for even a moity of their original cost; ships that are still costing the public around $50,000,000 a year; ships that are ageing and becoming obsolete with virtually no new ones in prospect to take their place.

Of a real merchant marine we have scarcely any more than before the war. It is true that considerably more of foreign commerce is being handled in American bottoms, but little of it is thus handled on a natural or economically sound basis. Moreover the proportion thus handled is declining, as it has been doing virtually since shipping incident to the war ceased. Three-fourths of the government's ships are laid up and rotting away at a cost, for care alone, of several million dollars a year. While privately owned shipping has grown, it has not grown and is not growing notably along true merchant marine lines. In the real overseas trade, that is, across the Atlantic and Pacific oceans, it still counts for very little. Most of it is confined to the protected coastwise trade.

Congress decrees, and the public generally agrees, that the operation of merchant shipping is no proper function of government. Yet government operation has gone on now for seven years, at heavy financial loss, and private operators still are forced to compete with the U. S. Treasury.

Meantime, ship building, of vital importance in the development of a secure merchant marine, has dropped back substantially to its pre-war insignificance.

Yet the money we have spent during the last seven years on ships and their operation would today buy all the seagoing vessels in the world and operate them free of charge probably for the next quarter of a century.

Where does the trouble lie? In many quarters. In the first place we have never decided nationally that we need a merchant marine. We assume that we do just as we assume that the attainment of heaven is desirable and yet postpone it as long as possible. Thus we have no fixed national opinion as to what would constitute a satisfactory merchant marine. There are individual opinions and many guesses but no settled conclusion. And as a people we haven't any notion how a merchant marine should be truly brought into existence. For the last three years all that the Government has done is to play the part of McCawber, dawdle along with the notoriously futile Shipping Board scheme and wait for something to turn up.

We pretend that we want a secure privately owned and operated merchant marine. Yet laws which helped to drive

Americans off the sea continue, in the main, on the statute books, and others and equally handicapping ones are added.

After reciting various handicaps on the building and operation of American ships, the Shipping Board in its last annual report said: "The most serious ones, however, are due to restrictions put upon our ships by our laws for the general good of the country as a whole." That is to say, we pretend that a merchant marine is needed vitally for the safety and the general good of the country and then "for the good of the country" put upon it restrictions which bar its development.

Merchant ships are very important in time of war, whether or not the country is engaged in the conflict. This was shown in 1914 when business collapsed because, for lack of ships, our surplus products couldn't move from the ports. The defensive value of ships is proven by the $4,000,000,000 we spent on them largely on account of the war.

As manufactures grow, the further development of business and the well being of the country generally become more and more dependent on foreign trade. We cannot maintain our dignity, our rights, our prestige in world marts that know not the United States flag.

In the ports of the world the U. S. flag used to be the best known of all. No doubt it can again be put securely on the seas.

But the country must determine what it wants and how to get it. That it won't be attained through government operation or even subsidy seems evident. A good beginning would be the giving of American ship operators a free hand in the conduct of their business. When they had a free hand they were able to meet virtually all competition, though many economic handicaps which exist now, such as arise from higher labor costs in America than in Europe, prevailed then.

Unless something is done we will soon slip back into our pre-war isolation in the matter of ocean transportation within our control.

Congress Takes Up Immigration Problems.

At last Congress has got down seriously to a discussion of the immigration problems and the need for new legislation bearing thereon. For several years the subject of immigration has been covered by laws that now are fully out of date and out of harmony with the evident opinion of the country. Barring the "quota" rule, tacked on hurriedly in 1921 and continued from time to time, pending legislation covering the matter fully, the immigration laws are substantially the same that have been in vogue for the last quarter of a century or more. Those laws bar almost no persons who wish to enter the country. The literacy test, applied in 1917, is inadequate as a literacy test, which in fact is not of itself alone a sound way of passing on the general merits of any one. Provisions for barring the feeble-minded, criminally inclined and politically anarchistic read well but are of very little avail in keeping undesirable immigrants out of the country.

The "quota" rule, limiting admissable immigrants to 3 per cent of the nationals of various countries in the country in 1910, has made tremendous cut into the otherwise normal inflow of immigrants from Europe. Where under old conditions we would have been receiving a million or so a year, only a few hundred thousand have been admissable under the "quota" rule.

The new proposed legislation, developed after much study of the subject by the House immigration committee, retains the essence of the "quota" rule, but modifies it and renders it less harsh than it has been in the past. Under the committee's proposals the admissable quotas would be reduced to 2 per cent of nationals from European and other countries covered at present by that rule. The calculation would be made from the census of 1890 instead of 1910. This would increase the number of admissable immigrants from countries in northwestern Europe, which send us immigrants who are more assimilable than are those which come from Southern and Western Europe. Provision is made for non-quota admissions. This is for the purpose of softening the "quota" rule which, in individual cases, often has operated in ways that don't square with good humanitarianism. Husbands sometimes have been barred from joining their wives, children have been kept from their parents, very good citizens frequently have been unable to bring from abroad aged parents. In the proposed new law, provision is made for handling these cases in keeping with sound humanities.

It is estimated that the law advocated by the House Immigration committee would make it possible for 161,184 immigrants to come into the country annually. This would be fewer than present departures. Immigrants not of the white race from the Orient would be barred absolutely.

Whether the bill will pass at all or without being considerably modified is, at this writing, by no means certain. It is not likely to be greatly changed, except possibly in keeping the census of 1910, as at present, the basis for calculating admissable quotas.

But a national campaign practically is on, the foreign vote is large, that from countries most discriminated against by the proposed new regulations is the largest of all.

It is possible that, after duly wrangling over it, Congress again will pass this problem along to the future.

Europe Improves.

Whether or not the Dawes report on the German and European reparations problems is fully accepted and applied—which, whatever may be pretended, is hardly to be expected—it is beyond question that its advent constituted a milestone of great importance in Europe's progress towards recovery. The fact that General Dawes and the other Americans associated with him were permitted to make the report was big evidence of increasing sanity abroad. And as sanity is restored "normalcy" will follow.

But the terriffic billows of passion and hate made mountainous by the war will not subside for a long time to come, if ever. The wreck caused by them will not soon be restored. There will be many saggings as well as upward swings as time passes. But the sum of it will be steady movement towards substantial recovery. We have more than sentimental interest in this. Europe is our best trade customer. While we have supplanted much lost European trade with business developed in other parts of the world, we cannot get along assuredly well without a

healthy, active and a reasonably sane Europe.

Selfishness alone should cause us to go to actions that may look extravagant in restoring European conditions to something like normal. Primarily we will not be helping peoples who may not be deserving of further generosity on our part nearly so much as we will be helping ourselves.

Visual Education

BY J. HARPER OLMSTEAD

A perfectly human interest in moving pictures is responsible for this article.

Everyone who is old enough to read sub-titles—or to painfully hear them read by the person in the next seat—knows the contribution that the modern motion picture, through travelogues, and news reels and historic productions, has played in bringing the world closer together, and broadening knowledge.

Its influence in this respect is rivalled only by the more lately popular radio receiving station.

The justification for this discourse upon the "movies" in a textile journal, however, is in the consideration which will be given to the part the moving picture has played and is playing in the education of the children in the mill village. Which brings us to our theme—Visual Education.

This may seem to be rather academically out of the accustomed sphere of the cotton mill executive—but visual education means simply the utilizing of the quickly receptive powers of the eye in instructing the coming and more or less rising generation.

To speak concretely: It means that where you and I were given a meager word-description and a more or less—generally less—accurate photographic presentation of a country in our geography lessons, the school children of today, through the magic of the celluloid, have transported before their own eyes actual present-day scenes in that country. And soon with a thousand other illustrations.

It was but natural that visual education should follow in the wake of the motion-picture as a means of entertainment. Shrewd money-men in Hollywood and elsewhere recognized that of all the five senses through which we receive impressions of the external world, the eye is "the principal gateway to the mind." Is it not proper, then, that this physiological—or psychological—fact, or both, should be used in the educating of the children of the workers in the mill?

In addition to the point already made, there are several cardinal facts which prove the advantage and value of the motion picture from an educational standpoint. As indicated, we receive far more impressions through the eye than through our sense of touch, our sense of hearing, our sense of smell, and our sense of taste combined.

Then pictures speak a universal language—they make *direct* impressions. The school child seldom has the past experience necessary to understand words, which after all are mere symbols. Pictures *show* the thing to the children.

Everyone appreciates the fact that a child is just naturally "fidgety"—because everyone has been a child and, therefore, has been "fidgety." Here motion pictures add to their value in instructional work, for they attract and hold the interest of the pupil more easily than practically any other method of instruction. In most cases the motion picture gives the nearest approach to actual experience, and Experience still retains her well-known reputation as a teacher.

And a child can be taught more quickly—information can be imparted more rapidly—through the motion picture than through any other medium. Prove this yourself: How much longer would it take you to read "The Shriek" in book form, and obtain a thorough mental grasp of it, than it would take you to see it depicted on the screen by Rudolf Vaselino and his amorous cohorts? Which method would you choose?

Look at it this way: Mr. Practical Man, if we're getting too pedagogical (that one slipped) for you—

You're interested in labor-saving devices for your mill, aren't you? Something that will shorten a process, or simplify things? Something that will accomplish a given task with less labor, more work in a given time?

Well, that's what the motion-picture does for the worker—in this case the Mind of the student—allowing it to do these things and thus approach each new task with less fatigue and more enthusiasm. And as labor-saving machinery usually means more employment for the worker, so does saving labor for the mind help it to accomplish more difficult things than would have been possible otherwise.

But to leave generalities—and even forego that corking "wind-up" we had planned—let's take a concrete illustration of what a mill *is doing* with visual education. That's the big thought among mill men today in their discussion meetings, etc.—to get the other fellow's experiences. So suppose we have Professor C. W. Coleman, superintendent of the Southwest LaGrange School, which is a graded public school supported in part by the Unity Spinning Mills, the Elm City Cotton Mills and the Hillside Cotton Mills, at LaGrange, Ga., tell us of their initial use of moving pictures for educational work and give us an idea of what has been and can be accomplished.

Professor Coleman speaking:

"For the past four years, we have used motion pictures as a part of our school work. These have been shown in the school auditorium, which was equipped in the beginning with machine, screen and dark shades, and which will seat approximately 500 children. As a rule not all the classes are shown the same pictures, some of the latter making appeal only to the younger children and some only to the most advanced grades.

"In the beginning no particular effort was made to correlate the pictures with the other subjects of the curriculum. A period was simply set aside two or three times during the week for 'moving pictures,' and, while the selections were always of an instructional nature, the predominating motives were general information and recreation. The films were usually one-reel in length, were obtained at a nominal rental from the regular commercial exchanges, and consisted of scenic views, news events or industrial processes, with possibly a cartoon or other comic ending.

"Among our best offerings were the Bray Pictographs, the Burton Holmes Travelogues, the Pathe Review, the

Pathe or Fox News, and the Ford Industrial Weekly. A large number of geographical and industrial films were obtained from the Bureau of Commercial Economics at Washington, and the Red Cross furnished some valuable European material. The following list of titles will give an idea of the range of industrial studies: Lumbering in Canada, The Pipe of Peace (tobacco), Inside Out (bone buttons), Home Comfort (building stones), Extracting the Core (pattern making), Pottery in China, Bacon Curing, Sugar Cane Growing, Shoe Manufacturing, Cloth Manufacturing, The Wool Industry, Cotton Spinning, The Fruit Industry, Fishing on the Great Lakes, Story of a Grain of Wheat, From Cocoon to Milady's Gown, Covering the World (hats), Under the Feet (carpet making), Holding the Hand (glove industry), Parting of the Ways (saw industry), Speech of the People (newspapers), The Spirit of the Flowers (perfumery), The Milk Industry, Coal Mining, Pen-Points of Progress, De-Light (incandescent lamps), Bubbles (soap).

"The usual method of study was to have the pictures viewed prior to a class showing, prepare outline and questions, and present the subject in the classroom from this written material. The children were expected also to recite on certain specified facts upon their return. Occasionally it was possible to obtain synopses from the exchanges some days in advance."

That was the beginning. Then, as time usually brings improvement in all things good just as it does in wine, a more comprehensive recognition of the educational possibilities of the motion-picture came about. Specific attention was given to this phase. The government, through its Bureau of Commercial Economics, as pointed out by Professor Coleman, extended its service by furnishing films on subjects with a definite relation to the subjects taught in the regular school course. The exchanges and distributing houses saw the field and became interested, and so, continued Professor Coleman:

"As strictly educational sources of material were developed, it became easier to attempt definite correlation with geography, history, civics, science and literature. The Society for Visual Education, of Chicago, was one of the pioneers in this direction, and many other producers and distributors of similar nature have since come into the field. Several of the large commercial producers have established Non-Theatrical Departments, and have issued special catalogs of films suitable for school use. Periodicals such as Visual Education, The Educational Screen and The Moving Picture Age have contributed valuable assistance to the advancement of both subject-matter and method."

Here Professor Coleman exhibited a list of subjects culled from various advertisements which strikingly indicate the progress that has been and is being made toward the school-room type of subject. Under the general subject of "The Foundation and Settlement of the United States"—a subject familiar to every school-boy, whether he exactly remembers whom Pocahontas married or not, we find these enterprising, progressive film-producers depicting in picture such important epochs as "French Explorations in North America," "English Settlements in North America," "Struggle of French and English for North America," "War of the American Revolution," "The Louisiana Purchase and the Lewis and Clark Expedition," "Across the Rockies to the Pacific," etc.

In the study of the economic history of the United States, "The Steamboat in United States History," "The Railroads in United States History," are illustrations of films that may be used very effectively as contemporaneous instruction.

"Getting Acquainted with Bacteria," and "Waste Disposal in Cities" are two educational films that can be used in the teaching of health and sanitation.

Or, in geography, contemplate the effectiveness of presenting actual scenes from New England, with its ice-laden trees and snow-covered fields to a lad down in Georgia who thought he'd seen Winter when he looked out and saw on the ground a thin white blanket that quickly vanished under the influence of Old Sol when he got under way.

Or of presenting to him, within the compass of minutes, the entire process of growing, cultivating, gathering, assorting, packing and shipping oranges in California, or the methods used in Kentucky for growing, cutting, storing and manufacturing into smoke-able form the long green tobacco leaf.

Or in the study of plant life, of showing him, through the means of the eye, how a plant is developed from the first stages of natural formation up through the various stages of growth and development.

But the subject seems limitless in illustrations of its possibilities. We must pass on.

Even with its successful application up to the present, Professor Coleman points out, "the movement is but in its infancy. Special textbooks must be written, complete libraries of films produced, and a method of instruction evolved which will at once provide for the necessary correlation between pictured subject and written explanation, minimize the inevitable expense, and properly adjust the new materials to our ideas of the educational process. We are among those, however, who believe that these things will be accomplished and that the motion picture will be a factor of constantly increasing importance and value in the educational method of the future."

The things thus suggested by Professor Coleman will undoubtedly bring this use of the motion-picture to a still higher level of effectiveness; this will be brought about through coordination and cooperation between the leaders among its use and production for this purpose. It should be borne in mind, however, that at the present time it is possible of very fruitful application in the mill school to a definite advantage. COTTON'S survey for its Anniversary Number indicated the purchase of several hundred motion-picture machines. Most of these, doubtless, were for entertainment purposes, but, as in the case of the Callaway mills at LaGrange just cited, a number of them are being utilized to educational ends. As the value of visual education becomes more generally recognized, the number of mills making use of this medium in their schools is certain to increase.

It is announced that the name of the U. S. Ball Bearing Mfg. Company, makers of "Strom" ball bearings, has been changed to Strom Ball Bearing Mfg. Company. The new name is the only change, it is stated, and the personnel of the company will remain the same as will the high manufacturing principles of the concern's business. The address remains at 4527-4567 Palmer Street, Chicago, Ill.

Scientific Trends With a Textile Slant

The outstanding significant trend of any time is reflected through diverse mediums. Sometimes it is shown by a market condition, occasionally by a public movement of large dimensions, again in the message of a discerning author.

Upon the pulse-action of the various arteries which contribute to our economic and industrial structure the vigilant man of business shapes his policy and strengthens his organized effort.

Sometimes many factors affect the situation, at another time only a few are outstanding and vital. The sinews of war include the jewel and rare mineral as importantly as the cannon and the high explosives.

1.—Trademarks and Trademarking.

The recent markedly increased interest and appreciation of the importance of the trade mark has not only aided the development of considerable business in affixing these symbols to various textile materials but has inspired the invention of a semi-lithographic method of performing this work.

The idea is significant as marking a realization of the importance and worthiness of study of the "business card" element of merchandising.

Within the possibilities which this method offers are the likelihood that it affords a means of preparing samples of printed patterns without the necessity of either standing the delay or the proportionally high cost of the roller-engraving process, prior to their issue. In such application it offers means to feel out the trade on new lines and specials. It has been demonstrated already that the method is effective in the production of novelty prints on small areas, such as notions in felt and cloth.

Little development cost is involved in the full realization of the application of the method—the whole process requiring a negligible amount of equipment and even to bring it to its present stage of fairly complete realization in certain fields it has required a relatively insignificant quantity of labor.

2.—Paint and Painting Methods.

The work which the American Society for Testing Materials has carried on during the past few years in developing and improving methods of painting with mechanical sprayers is now at such a point that it offers a practical text in this most modern application of an hitherto overcostly item of mill preservation.

Despite unreasonable opposition of certain labor groups the advancement in technique of this method over hand painting is sure to establish the universal method for industrial properties.

Amidst the volume of advertising of various paints by the several manufacturers the significance of the cost advantages of this method to the user have been incompletely rated. (To have stressed methods of this application would have been to discover increased markets for their product.) It would seem advantageous to the mill manager to study the benefits of this technique as it has such a direct bearing upon maintenance costs and efficiency in working conditions.

As the various equipments in use are improved it is becoming more and more possible to control such factors of painting as:

Uniformity in covering power.

Regulation of coat in terms of the paint being used.

Efficient painting of places of difficult accessibility.

The utmost is being done to incorporate practical experience in painting into the construction of these sprayers. Sympathetic cooperation on the part of the mill maintenance department with the makers of this equipment and transmission of experiences encountered in their use will do much for the manufacturer of such equipment that will react as a benefit to the mills themselves, and all intermediate factors concerned.

3.—Apparatus for Control of Process.

Improvement in temperature-recording instruments, enabling coincident registration, at will, of the time and temperature of an operation marks a trend in the development of process-control instruments which is indicative of study of the functions of such equipment in mill schedules.

Ultimately, properly developed apparatus of this nature must permit closer attention of the individual process worker to his task, while at the same time insuring that:

1. The work receives proper automatic regulation of its variables; and

2. That the recording of necessary production statistics does not include "bookkeeping" worries for the operative.

It would be well for manufacturers of such equipment to study the details of scientific management systems as they are worked out in mill practice and to incorporate into their devices certain functions of these systems now being performed by personnel. Many of the details and annoyances of so-called "systematizing" might then be eliminated, through the increased employment of such properly developed monitors of quality. In the earlier stages of detailed scientific management very little instrumental equipment was available to carry the burden of these annoying (though necessary) details of such systems. Increase in functions, of equipment of this type, will do much to sell scientific management to the still reluctant.

4.—The Boll Weevil.

The monument to the boll weevil as a great benefactor to the South presents a point of view not shared, I believe, by the professional cotton man. The farmer who learned from this adversity to diversify his crops was willing, however, to express himself in that symbolization.

There is a strong feeling of another kind, though tending to the same outcome in certain quarters, viz., that the intelligent consumer viewpoint is coming to be that it is not an unmixed evil if shortage and high price in cotton would deflect one's purchases from cotton goods to the infinitely more lasting fabric, linen.

Considering this element as a *danger* to the cotton industry and the primary idea as a *blessing*, the question often occurs whether the people most in position to take action in this situation really want the complete extermination of the weevil. This is not made as an insinuation but is a very big "why, then" in some minds.

No one would be so foolish as to accuse the South of ever having cultivated the weevil, but has the full danger of the situation to the cotton industry been appreciated, and if it has:

1. Why is there so much disagreement as to the efficacy

of the generally-used method of combatting the pest?—and

2. Why do certain important figures in the industry refuse to entertain projects (which they have not even examined) for its relief?—also

3. What has been the outcome to date of the much heralded foundation work to overcome the evil, and concerning this work (to quote the Irishman) "Is it a private fight or can anybody get in?"

Careful study of the history of progress in cotton culture would seem to indicate the presence of a considerable amount of scientific material and progress which might be applied to the solution of this problem. This material is scattered over many branches of science. Shall the whole range of knowledge be invoked to aid our distress or do we pin our faith to arsenate?

5.—Auxiliaries and Tools.

Such special items of equipment as the portable grinder operating from an electric motor and having its grinding element on the extreme end of a flexible extension element, are the sort of thing which make emergency repair and alteration facilities a fact.

Special tools are often used far in excess of standard ones. The growing realization of the importance of maintenance and other shop work in textile mills demands that ample facilities be given to the crews operating in these capacities.

The manager who is close to typical mill men and tradesmen is fully aware of the value, in contentment of these men, afforded through the use of proper equipment.

Even where emergency demands are the daily experience it will be noticed that the boss never appears to be *quite* as unreasonable if his demand is backed with facilities which put it up to the crew to outdo themselves in a display of skill. One mill engineer has said that he believes flexibility and versatility are the most valuable qualities to have in an organization. Training of a mobile unit around the efficient use of tools with wide emergency adaptation is one of the surest means of realizing this condition.

6.—Dyes and Tendencies in New Development.

A departure from the established tendency to produce dyes that duplicate or improve on qualities (only) of prewar German types has appeared in the shape of cotton dyes which act as auxiliaries or complements to the rule of these older dyes. The function of the new types is to fill up blanks in the existing scale of colors available through self-dyes, and at the same time to furnish dyes which serve to produce a new practical range of desirable colors *when used with the old regulars.*

These new dyes occupy an unique position in industrial development—enabling realization by the shortest route at present available—of many shades hitherto produced only with extreme difficulty in acceptable fastness, and those only by the employment of complex dyeing formulas.

A whole new range of possibilities is opened up for the mill man by this start, chiefly in that now that the value of such a type of dye has been demonstrated, the demand for invention *in properties and auxiliary qualities in dyes* (which must inevitably be urged by the mill demand as an ultimate outcome of this development) will supersede in importance and perhaps dominate future policy in research for new dyestuffs.

The color-process man of the mill, cooperating with the stylist, can remove some of the criticism directed toward dyes now on the market by reporting to his trade association improved dyeing results and formula simplification obtained through study of his everyday production demands, as well as by suggesting *exact colors* which it would be well to have available on a self-dye basis. The fear of disclosure of "intimate trade secrets" by this procedure must go into the discard for the sake of benefits which will ultimately return a thousandfold.

7.—Color.

The study and development of color technique is now a prominent activity of at least five major industrial-technical societies:

The American Society for Testing Materials.
American Chemical Society.
American Optical Society.
American Physical Society.
American Ceramic Society.

When it is realized that more than half a dozen group-industry laboratories are engaged in similar effort, that a number of prominent universities devote special effort to this work, that a dozen or more special private researches in it are in progress, that several consulting headquarters for such work are now established and that a large number of industrial laboratories include programs and even separate sections devoted to this work the growing importance of it will be recognized.

The existence of laboratories and specialized programs in national societies is of importance to the business man chiefly as reflecting public-industrial demand. No longer can the enthusiast be accused of overrating the importance of color as a factor in commercial assets. It is one of the majors, most vital to successful bidding in quality markets. The textile manufacturer who disposes of this question with the observation that it is provided for amply in his art and process departments will awaken at an early date to discover that style and quality trends are being handled by means of a technique with the *language* of which he is not even familiar.

In a science where the workers are just getting into their full stride it would be a presumptious individual who would venture to predict even the immediate possibilities. Marvel follows advancement daily and not only is today's discovery ancient when it reaches tomorrow's printed page but tomorrow's thought and invention are resultant of a constantly accelerated pressure for achievement. Technique will shortly usurp many of the functions earlier dependent upon creative skill.

Fortunately, the sentiment for cooperative effort is strong among the various professional society activities. One prominent figure, who is close to certain phases of the cotton industry, recently urged the necessity to creative style, of increased study of the science of the visual and psychological laws of color appeal. His opinion reiterates oft-repeated statements and warnings of specialized workers in the field of color science. This sort of investigation is one of the most hopeful sources of research productive of early dividends. It requires proportionately little outlay in equipment and when founded upon the background of sufficient experience in theoretical and application technique will bring forth results of immediate commercial application.

What Other Men Manage With

BY R. A. SONIAMAN.

The benefit derived from a visit to a fellow executive's plant is obvious. Chiefly conspicuous, perhaps, is its value of comparison of methods, costs, productions, qualities, wastes, and so on, between the visitor's own mill and the one he is looking over.

Often, however, the operating executive who has taken advantage of an opportunity to visit another mill, comes away with a painful sense of having failed to get the maximum good out of such a trip. There are so many things he has forgotten to look at or to inquire about.

From the exprience gathered after looking over many establishments, the writer would therefore suggest that any mill man who expects to utilize to the fullest the advantages of a trip to another plant, any overseer who would like a somewhat intimate acquaintance with the workings of another department, should, previous to such a visit, make notes of the different things he wishes to look over or inquire into, and to arrange these items with some approach to the sequence of the processes involved. Also, if time is a factor, to put the more important ones first.

Although he urges the reader contemplating a visit to start at the beginning and keep the proper sequences well in hand, the writer is going to commit the age-old fault of not practicing himself what he preaches. In short, he is going to arrogate to himself the liberty of dodging in and out of a department, or skipping here and there in the same, as the spirit seizes him.

It is, of course, desirable to know, when one is looking over a mill, what the finished product is so that the organization of machinery can be kept in mind. For example, many cloth mills sell large quantities of yarn in addition to the cloth, so that in instances like this the number of looms cannot be used as an index of the rest of the equipment.

Again, some silk mills using cotton in their product have a dual organization of silk and cotton in which for some reason or other the cotton end has been so greatly accentuated that a side business of cotton yarn selling has been inaugurated to keep the cotton equipment and help fully employed.

To many of us a good deal of the matter mentioned in this discussion may seem as simple and unimportant as a thoroughly digested primary number table to a child in the grammar grades; nevertheless, it should be remembered that this really valuable educational and economical acquisition left its indelible imprint on the child's memory only after numberless repetitions of the laughably simple 1 x 1's.

More or less scrambled and rather roughly outlined, are the following items one would wish to take up:

(a) Type of buildings, whether of old or modern construction; their relation to one another and to the locality that they are in; the general appearance of the buildings themselves, and the condition of the grounds. Some mills are built in dumps, and remain therein to the end of their time; others make of their grounds a thing of beauty—to be appreciated by the workers, and applauded by all others.

(b) The warehouses for the raw cotton, together with the facilities for handling the bales.

(c) The types of machinery and its layout.

(d) Sequence of the operations.

(e) Methods of manipulation at each process.

(f) Workers, their nationality, duties, wages, etc.

(g) Power plant and driving of machinery.

(h) Transportation of material (inter-departmental and intra-departmental, also between separate buildings of the plant).

(i) Firefighting apparatus, and methods of handling fires.

(j) Speeds.

(k) Organization.

(l) Administration, clerical department, cost accounting, etc.

(m) Experimental work.

(n) Mechanical branch.

(o) Engineering branch.

(p) Accessibility to labor market.

(q) Method of caring for future expansion of plant.

(r) Condition of floors—cleanliness and upkeep, also wood used.

(s) First aid facilities.

(t) Workers affliated with unions.

(u) Supplies.

(v) Welfare work.

(w) General.

(xyz) And so on through the entire gamut of the alphabet, and then further.

Anyone who has waded through the foregoing is hereby invited to feel himself absolutely *ad libertum* to re-arrange these details as he sees best; to add or subtract as the spirit inclines, or the need dictates.

Starting at the cotton shed, one naturally looks to see if a spur track runs to the store house. It is interesting to note that many large plants which have grown from small beginnings at their original site, have plenty of land at their disposal for expansion needs, but are without any of the larger facilities for transportation—such as railroad or boat.

Such plants, if wisely directed, will build a large warehouse (Fig. 1) on the railroad in an outlying district so

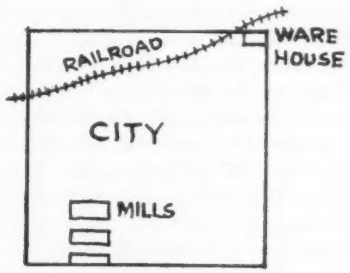


Fig. 1

that freight cars can be expeditiously unloaded. In short, the advantages accruing from such a procedure are obvious. These plants will usually have a storehouse at the mill of adequate size for their daily needs.

Inquiry as to the transportation of raw and finished

material often brings unexpected illumination on the subject. A case in the writer's mind is that of a large plant whose location is such that a 40-foot street separates it from railroad facilities. On the other side of the street, a small building, of ownership other than the railroad, was an object of such a strategical maneuvering as one generally expects to meet with only between the covers of a novel dealing with big business. It may interest readers to know that the larger plant eventually obtained control of the smaller one, but the price paid for it is still whispered about with awe.

The storage of cotton bales should be noted, taking especial cognizance of the method of tiering and whether the bales are so disposed as to be easily accessible. Does the old go out into the mill as the new comes in? Can the bales be taken out so as to insure a good mixing? Are the bales so arranged that cotton of different prices can be handily reached to make an economical mixing?

Before any cotton is used at all, is there any system of checking the grade and staple of the cotton? Who does this checking? What is done with cotton of lower grade and shorter staple? A friend of the writer's has earned his company many thousands of dollars on allowances on off-grade and off-staple cotton.

While at this point, it is well to find out what cottons are used, and it is often enlightening to learn why a certain cotton was chosen. Who originally selected that particular type of cotton? A mill in the East making a fine class of woven goods will not have any Alabama cotton. The reason given is that some years ago the cotton did not measure to the character expected of it and the mill had since been afraid to try it again. Another mill started with Georgia short staple, and cotton grown in any other state is taboo. Yarn from this mill is sold to silk mills using cotton in their products and has to be of good quality.

Is the length of staple a factor that was considered for the counts now being spun? This is an interesting phase, since some mills—especially yarn mills—may swing from the making of coarse counts to fine counts, and vice versa. One mill the writer went through had been amalgamated with one of the big textile combinations consummated lately. From a yarn mill having a wide range of counts, it had been ordered to confine its activities to the making of just one count. This yarn was made into warps which were transported to another town for weaving.

Is the mixing done in a thorough manner, and just how was the blending decided upon originally. If there are various grades, colors, etc., in what proportion is the mixing done? Does careful attention to mixing make for a real saving for the company? Do the men who are responsible for the preparational stages of the yarn believe that the cotton is of the kind that makes for a real saving, or can they prove that what is considered as a splendid buy in the office at 25 cents really comes a bit higher than 28 cent cotton after the dirt has been pounded out of it?

Mixing for strength so that the latter quality is increased without a corresponding augmentation of the cost is a feature very desirable of being aired. A change in cotton resulted in a 2 per cent increase in the breaking strength to a firm already noted nationally for the high breaking strengths of its product and who were especially watchful of this characteristic in the particular numbers affected.

Is the opening department housed in a separate building, or is it in the main building? Many plants having more or less self-contained units in close juxtaposition have adopted the plan of a centrally located opening house as in Fig. 2. Such an arrangement serves several purposes:

(1) It saves time in transportation of the cotton.

(2) It is easier to handle in case of fire.

(3) It makes for a better and more thorough mixing or blending.

(4) It reduces the cost of handling.

Modes of feeding the bale breakers are various and it is worthwhile to note the divers ways. Some mills have a

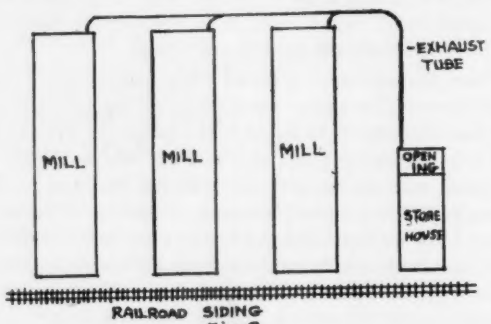


Fig. 2

long traveling lattice, Fig. 3, around which are placed from 12 to 20 bales from which layers are taken as predetermined; whereas other places have a short apron with the bales disposed in two rows running back from the machine. An attendant takes a layer from each bale in turn and

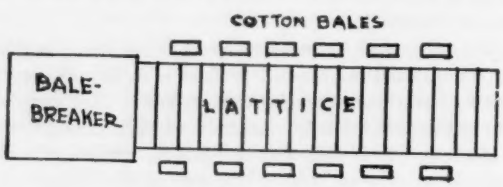


Fig 3

throws it on the apron. Some mills throw the cotton into hoppers having no external lattices.

Opinions as to the value of aging in the bins are often conflicting, but a progressive man would be derelict in his pursuit of increased knowledge if he did not inquire as to his friend's idea on the mixing and aging question.

To throw some light on this problem, the writer would say that he went through a mill sometime ago in which the cotton was stacked by hand direct from the bales in four bines each of which held one week's mixing. This meant that the cotton had an aging of four weeks. (This reads almost like the advice of old English textbooks on mixing.) The superintendent was enthusiastic about the aging feature, claiming that he was getting a pound or two better breaking strength than another mill in the neighborhood using the same kind of cotton, the same kind of machinery, the same settings practically, the same speeds practically, but with comparatively no aging. Here is food for thought; for it does seem as though the modern tendency is to get away from aging altogether.

The arrangement of the bins or stacks is worth going into. In one mill, in an old established cotton manufacturing center, the writer noted with surprise that a huge mix-

ing, Fig. 4, was situated between the openers, which were located against an end wall, and the exits which were at the other end of the room. In case of a fire, imagine the conflagration! The ceiling had no fire-proofing, the floor was of wood. So extensive was the high stack of cotton, which was packed close to one wall, that there was just a bare eight feet of passage on the other side for the picker help to get to and from the openers. No escape in case

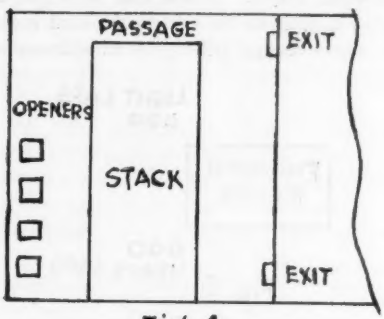


Fig. 4

of a fire! A comparison then, of the visitor's own opening department with that of the visited plant will either give him food for serious thought or for thankful congratulations.

The location of the picker room is also an object for consideration. Some mills to obviate risk of fire, have the pickers housed in a building separated entirely from the main building, connecting the two by a fire-proofed passageway from one to the other, with fire doors on guard at each end, as in Fig. 5. Still other mills have the picker room in the main building, with firewalls and doors as a protection. Some mills haul their bales of cotton to a second floor, open it, and then let it drop into bins below, while others open on the ground floor and then raise the cotton to the second story. One mill the writer has in mind opened its cotton in the cotton store house across a public street from the mill, and exhausted the opened cotton under the street.

Is the machine for the first process simply a bale breaker, or is it a combination bale breaker and opener? Another matter for investigation is that of combination opening machines in which there are several beating processes. Were such machines installed for the express purpose of making use of a cheaper, dirtier cotton?

Since Crighton openers are again becoming objects of interest to cotton manufacturers, it is essential, obviously,

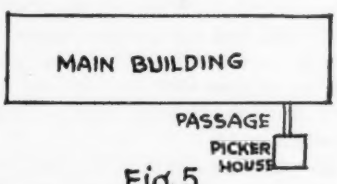


Fig. 5

that in order to shape one's own future course, to get the opinion of a man who actually uses such a machine, day in, day out. Is it really a maker of a better product? Have any tests been conducted to get comparative results between the regular porcupine beater and the Crighton? Are these tests considered conclusive evidence in favor of one or the other?

Questions concerning the relative advantages and disadvantages of the several makes of picking and opening machinery discloses many interesting points of view.

It is the practice in many mills to let their opened cotton fall on the floor near the breaker pickers from which point it is carried by the workers to the lattices of the machines. "How much neater is the condenser and gage box attachment!" was the remark of a mill man on seeing pickers so equipped for the first time.

"Yes," replied his guide, "and it is a good thing, too, when you are running two or three kinds of cottons or staples parallelly."

Overhead lattices with control switches to distribute the cotton into separate bins are also made use of by mills that have several mixings of one or different kinds of cotton all the time.

Is there a cleaning trunk? And is it satisfactory? One well-known mill making a fine grade of weaves use a cleaning trunk with their opening machinery and they say it is as good as an extra beater. And what they particularly like is that they get a cleaner product with a less harsh treatment of the cotton.

Is the old system of weighing a specified amount of cotton in scoop scales and then spreading this cotton evenly over a marked area on the feed lattice being pushed far down the road to obsolescence by the self-feeders? A world famous corporation still uses this type of feeding.

Are the pickers laid out in batteries with plenty of room for the cotton and for the operatives? Does the material move onward in a straight line? How many processes of picking? This question has driven many mill men to loggerheads with one another. One mill man, very well pleased with himself over his foresight in having his new mill equipped with a 3-process picking system, said to the writer:

"You see the point? When we run American cotton we use all three processes; with Egyptian and Sea Island, only one or two. But the big thing is that the machines are here when we need them."

The practice of this mill man—of using less picking machinery on long staple cottons—seems to be in keeping with the modern trend of picker room procedure. Short, dirty cotton, maximum processes of beating, tapering off for cleaner grades or the longer stapled and cleaner Egyptian and Sea Island. Indeed, one firm with international ramifications uses only the bale breaker and then a single beater finisher picker. Obviously, only the very finest of cottons are used by this firm. Another mill, famous for its New England made products uses the porcupine type of opener behind its breaker picker. One inch and one and one-sixteenth inch Georgia cotton are used by this concern and three processes of picking are carried on.

Coming to the highly interesting matter of beaters on pickers, we find ourselves confronted with three well known types: (a) 2 blade, (b) 3 blade, and (c) carding.

The first no doubt is still the more popular of the blade beaters; whereas the last is probably not quite so well understood as it might be.

Complaints have been voiced that the Kirschner or carding beater curls the fiber of long staple cotton. Be that as it may, anyone who has ever looked at the fringe of a lap of short-stapled American cotton which has been subjected to the action of a carding beater, and has then

examined the fringe of a lap of the same cotton by an ordinary blade beater, must in all fairness admit that the carding beater certainly does possess a splendid combing action. If again, one were to scrutinize for comparison, the cotton delivered to the cages by the carding and bladed beaters, respectively, the writer feels confident that the former will receive commendation for its property of a finer separation of the matted fibers.

The speed of beaters is also a matter for a diversification of opinion, but there seems to be growing a movement to arrange picker blade speeds so that the cotton will be struck not more than about 50 blows per inch. This latter figure is being taken somewhat as the standard of maximum beats—diminishing in proportion to the number of beaters, or the cotton used. Settings of feed plates and feed rollers from the beaters probably differ but little, mill for mill, on the same stock, but it is well to spring a question regarding the matter on your friend.

"How long is five minutes," once nearly stumped a judge and jury, and "how great a variation on either side do you allow your laps to get by with?" is often a sticker for a mill man to answer.

One-quarter pound, one-half pound, three-quarters pound, one pound, and even one and one-half pounds were told the writer. As various as the answers to the foregoing are the methods of weighing the laps; and just as diverse are the scales used for the weighing. Platform scales, high, low, and in between, are used, but mostly in the older mills; while in newer, or more progressive establishments, the load and look type, with springs or without, are in vogue.

Is a record of the lap weighings turned into the office and is a copy kept by the superintendent and carder? Does the picker boss follow up the weighing, or is the weighing simply a perfunctory affair—a mere matter of form?

Are the laps ever subjected to a careful inspection by the carder and the superintendent? In order to get a better idea of the actual variations existing in a lap is it a daily custom to weigh a running yard or two? Are these weighings closely followed so that unusual fluctuations from the standard can be investigated and rectified?

When laps go beyond the pre-determined limits of variation, are they set aside in two piles, as in Fig. 6, one above standard, one below, and are light and heavy laps put together when running over again? Or is it considered that by running the laps over again, the evener will make matters right? Have any tests been carried out to prove or disprove which of the above methods is the better one?

Have you looked around to see the sizes of the laps on the finisher and intermediate pickers—are they of different sizes so that only one at a time need be replenished; or, are the laps running out two, three, or four at a time?

Are there split lap preventors? The question is often a disconcerting one. The writer some years ago was shown a home-made affair not dissimilar to the cast ones now being used. This device was located between the cages, and the superintendent, who had worked up the idea himself, was very proud of it, saying that since its advent he had no more trouble with split laps.

The storage of laps should come in for deliberation. Some mills pay but little attention to this point—even some fairly large firms seem to have forgotten that laps take up room. Other plants, however, have taken cognizance of the fact that it might be desirable to have a stock of laps ahead, particularly where different staples or cottons are running concurrently in the mill. These concerns have a space allocated for the storage of the laps between the finisher picker and the cardroom entrance. Laps move in a direct line: Pickers, to storage space, to cards.

It is almost laughable to see how some mills solve the problem of transportation of laps from the picker room to the cards. One mill, in particular, had a system that was a risibility rouser. Several men were assigned for the purpose of lugging in the laps to the card room. One of the men was a dumpy little chap of extreme corpulency,

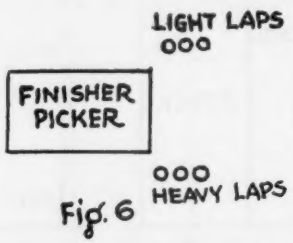


Fig. 6

whose walk reminded one rather more of a duck's waddle. With his lap on shoulder, he puddled out of the picker room and down a card alley, while myriads of beads of perspiration grew into little rivulets which coursed down the big blubber cheeks, the lap on his shoulder rising and falling as the short, fat, wide spaced legs pounded the huge bare feet with fearful slowness on the hard wood floors. And when the lap had been deposited in its resting place such a wheezing, and such a mopping of that strawberry red, full-moon face! Oh, yes, it was to laugh—and yet this mill had cut out extraneous workers here and there in other departments, and congratulated itself on being up to snuff in cost accounting.

More up-to-date places use special lap trucks, Fig. 7, either single tiered, or double, holding three to four laps

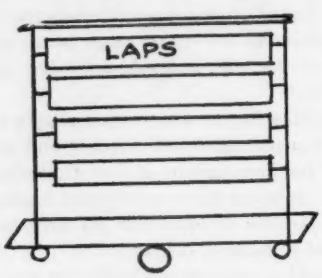


Fig. 7

in the former case, and six to eight in the latter. One man with such a truck will handle more laps with less fatigue than two or three men who carry out one lap at a time on their shoulders. Trucks, therefore, make for economical lap handling.

How is the waste disposed of in the mixing? Is a stipulated amount put in, or does it go in irregularly—sometimes a big batch, then just a pinch? If big amounts are allowed to be mixed in, does it cause laps to split, irrespective of lap preventers? What is the composition of the waste—stick, roving, and the usual sliver waste? What type of roving waste opener is used? Where is it located? Is its disposition such as to make it convenient to the regular openers? The writer recollects one arrangement in

an old sheeting mill. The machine was located in the opening room. Here a battery of openers were positioned against an end wall. Immediately in front of the two center machines stood the roving waste opener, so disposed that the opened waste dropped out in front of the openers, Fig. 8. The waste, naturally, was then evenly divided throughout the mill's product. What is the per cent of picker waste? If the day is a very windy one, the visitor no doubt will like to see if there isn't some cotton issuing from the draft chimney. How many times have we seen good cotton flying about our own mill yards like snow in a winter blizzard!

Fan speeds are often a subject of controversial argumentation. No harm and some good may come from an interrogation concerning the same. This brings the question of proper air drafts and fan-suction to the fore. Is the cotton evenly distributed over the screens? Are air leaks in evidence?

Is the dust-chamber of sufficient size to give good results? Can it be readily cleaned out? What is the area of the draft chimney? The writer was once led into a dust chamber in which several automobile trucks could have held

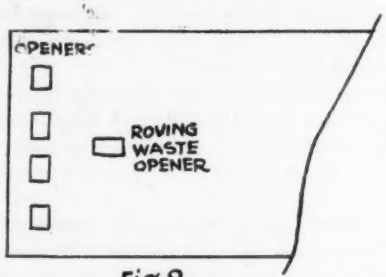


Fig 8

a race; whereas in another mill he absolutely refused to crawl on his hands and knees to examine the contents of the—what he was pleased to term—rat hole. How big should the dust chamber be, anyway?

Is the finisher picker fool-proof? That is, does the evener motion function so well that were a lap to run out unnoticed, the regulator would speed up the feed so that the deficiency would be fully supplied? Would your friend take a bet on this?

Are ball bearings used on the feed apron of the pickers? Are they giving satisfactory service? Do the results with the ball bearings actually show a decided improvement over ordinary equipped aprons? Under what conditions were the tests made? Do the balls ever break?

Under this grilling machine gun fire of questions, your friend may get a little hot under the collar. But persist! The beginning of the end is in sight. Is the oiling of the pickers done regularly? Or are oil cups merely ornaments? What is the per cent of time for cleaning? Is the production required easily maintained? How are repairs made? Are the parts apt to wear subjected to periodical inspections? Are fast moving pinions of fiber?

Suppose a fire were to start suddenly in one of the picking machines? What would be the instantaneous re-action of the picker room crew? Are chemical pumps handy? Are hose lines conveniently located? Are water pails in easily accessible places? Is there a regular drill of the picker room gang so that every one in the room will immediately fall into line when the eventful moment comes? The writer has seen some mill fires that did considerable damage simply because there had not been a thorough grounding of fire handling into the minds of the workers.

As to the workers in the opening and picking departments, a series of questions can be rapid-fired. What is the nationality? How many are necessary for the work? Are they willing and intelligent workers? Or are they slow moving dullards? Do they understand their duties, and what are these? Are the duties of each person worked out so that a full day's work for a full day's pay is the rule; or, are the duties and wages made up in accordance with the locality in which the mill is situated? One mill the writer vividly recalls, was located in the country, and the help were very tractable—the labor turnover was very small. And this in the heart of New England, too! Other mills in large cities nearby were seething hotbeds of dissension between the management and workers over duties and wages, and the labor turnover was a good deal like the ebb and flow of the ocean's tide—a never ceasing phenomenon.

Are cotton tests ever conducted? Every progressive mill executive naturally wishes to have some concrete evidence on hand as to just how any lot of cotton he is about to purchase in large quantities, or may have already bought, is going to act.

"No need of making tests if the cotton looks and staples like the sample type?" may often be heard. Just as well say that because moonshine whiskey loaded with poison, looks and smells, like the genuine article, that a physician would be justified in prescribing it for his patients.

It is just as businesslike to make a test of a new lot of cotton as it is to test a new lot of bobbins. A mill that does not subject its supplies to tests for the purpose of determining whether they are up to standard or not would be derelict in its duties to its stockholders. How much more important to know what the cotton will do!

One able superintendent believing that a mill should know what its cotton would do before too great a quantity was put through, made it a condition of his acceptancy of the general superintendency of a large New England corporation that a sample of every lot of cotton be put through every process up to and including the spinning; and it was required that running properties, waste, invisible loss, etc., be reported, in addition to other data.

Before leaving the picker house, it might be well to ask your friend if he is trying out anything new in the way of attachments to his machines. Is he perfectly satisfied with results as he finds them; or does he think he could get better results from a different hang-up. Would he purchase machinery from the same people who installed his equipment, or would he try somebody else's equipment. Why?

Has the picker machinery been laid out to take care of a possible future expansion of the mill? Have changes already been necessary to take care of a past or present increase over business as compared with that at the time of installation?

Some readers may feel that this subject is far from being exhausted—a promise with which the writer, after a quarter-century of mill experience, will heartily concur.

"I went to college in my younger days and thought I learned it all," a well known man once said, "but it seems to me that every day since I've been learning something new in this great big university of practical life."

Editor's Note.—This is the first of a series of articles

by Mr. Soniaman. The questions asked are open for discussion in our regular department entitled "How Other Men Manage." All readers are invited to participate. It is not to be expected that all will agree, but it is quite probable that each man will have his *reason why*, and that is what makes it interesting.

Spinning Discussion at Greensboro

A profitable discussion on spinning was held at the meeting of the Spinning Division of the Southern Textile Association at Greensboro, N. C., on Friday, April 18th. The attendance was good in spite of very disagreeable weather and the men participated freely in the discussion.

The place of meeting was the Y. M. C. A. Building of the Proximity Manufacturing Company, the use of which was granted through the courtesy of Bernard M. Cone, president of the company. This thoughtfulness was very much appreciated, and the courtesy of Mr. Cone, A. C. Arnold, head of the "Y," and others connected with the mills was gratefully recognized by a resolution at the conclusion of the meeting.

Carl R. Harris, chairman of the Spinning Division, was in charge of the meeting and conducted it in his usual able manner. James A. Chapman, Jr., of Inman, president of the Association, assisted Mr. Harris, and was called upon for a few remarks at the opening of the morning session.

Mr. Chapman spoke briefly urging that the men feel free to take part in the meeting. "Don't be like my cloth room overseer," he said. "We had a folder that was slipping and we couldn't locate the difficulty. After much experimenting we changed the cams, and that did help us some. Then I sent the overseer to some other mills to see what he could find out, and when he came back and told me what he had learned at the other mills, I asked him, "Did you tell them about our changing our cams?' and he answered, 'No, sir, I didn't; I thought I'd wait until I saw whether it worked or not.' Let's be free and tell what we're doing, we may be on the right track and help the other fellow."

As a starting feature for the meeting, Chairman Harris called on George F. Brietz, superintendent of the Selma Cotton Mills, Selma, N. C., who discussed the spinning room, saying in part:

"In looking back over the last forty-three years spent in the mill, the first 21 years of which I was oiler, band boy, section man and overseer, and the last 22 of which I have been superintendent, I notice there have been lots of changes and a great evolution in the cotton industry, not the least of which have been in the spinning room. A few of us can remember back in 1881, when the band boy had to make his own bands by hand, had to pull his cord by hand—they didn't know how essential good bands were to good spinning. He had to oil spindles twice a day at the collars, and three times each week at the spindle step. This was before the days of the gravity spindle, and these spindles weighed about fourteen ounces each, were about fourteen inches long, and made 5,000 r.p.m. He had to band the entire room, both spinning and spooling, and do all the brushing down overhead, carry out all the waste, and in those days we had fire buckets that trash of all kinds would accumulate in—they had not learned to hang them up but set them on the floor. The boy had to do this all for the stupenduous sum of 50 cents per day, and our pay came every two weeks and sometimes once a month. At that time girls did all the doffing, using no boys for that at all.

"Humidity in those days was obtained by means of the old goose cans, and sprinkling the floors, and it certainly did make things run better after a hot dry day. But we have learned better and have humidifying systems.

"Back in those days we had a 70-hour weekly schedule, and we also got about two regular holidays a year—a day and a half for Easter and two days for Christmas; that was the extent of our holidays.

"Looking back over my experience I can see that all the changes that have come about have been for the better, and there has been a great change in the management of a spinning room. One of the most important fundamentals in this work is having a specified time for doing everything. By this I mean a fixed time to oil all rollers, all fast and slow moving parts, a time to pick the rollers and clearers, and to wipe creels, and have a general cleaning on a specified schedule.

"Uniform bands are a very important factor in a spinning room. We have found through long experience that for a 7/8-inch whirl, that a band weighing about 70 grains, or about 90 to 100 bands to the pound, gives the best results.

"The percentage of waste to be re-worked should be watched and controlled. Of course we know about the top rolls being uniformly covered. If rolls are covered away from the mill they should be unpacked immediately upon receipt at the mill, and placed in racks to prevent grooves being made in them by their own weight.

"Uniform drafts and twist are fundamentals to be properly cared for. It should seldom be necessary to change twist on regular numbers, using the same cotton. This thing of changing production and quality is often overdone. With uniform numbers and cotton the twist gears on the spinning frame should seldom be changed.

"An up-to-date spinner will keep a record of the breaking strength of his yarn with just as much care as he keeps a record of the sizings. Not only should he keep accurate account of the number of pounds spun, but also of the breaking strength, each day, and also a careful spinner will see that he keeps the average pound per spindle and the average number spun in his room for the week, which will show him whether he is gaining or losing ground. Keep an accurate record of the breaking strength, sizings, pounds per spindle, and average number.

"Annual overhauling and cleaning is a mighty important thing. It should be done not less than annually. And in doing this the inside bolster—that little hidden fox that you cannot see—should be cleaned out good. The spindle bases should be carefully examined.

"Improper gearing is oftentimes overlooked and is the cause of much bad running work and loss of power.

"A careful spinner will see to it that his roving is moved from off the tops of his frames. How often we find an accumulation of roving on a hot dry day. It is a mighty good plan to have the card room hold up for a

half day if they are running ahead, or stack the roving up and get that dry accumulation off the tops of the frames, and then put the new roving right in line.

"The traverse stroke, both on the roller and on the ring rail, is an important factor. I venture to say that if you men here will go back to your mill and go through the spinning room and examine the traverses, you will find lots of them not making a full stroke, with as much as ¼-inch lost motion. Instead of getting 75 or 80 per cent of the stroke you will not get more than half, and the work runs bad and there is lots of trouble. The traverse stroke on the roller should be adjusted for quality and on the rail for quantity production.

"A wise spinner will find the time well and profitably spent to at least once a week weigh a bobbin from each spinning frame. It will take probably two minutes or less to do it and then make the sizing, and if you will do that systematically you will find a surprise awaiting you in the variation there is from one cause or other, when there has been much change in the gears, etc. This little time is well spent in sizing a bobbin from each frame and know what it is doing."

At the conclusion of Mr. Brietz's remarks, the chairman started the discussion by bringing up the question of the relative merits of filling wind on warp and warp wind for the same work. He asked for a show of hands, and Mr. Brietz, one of those indicating the use of the filling wind for warp, responded to the chairman's request for further information:

"We find that with the filling wind on warp bobbins there are a number of advantages, not the least of which is a more uniform tension," adding that the filling wind eliminates a considerable strain of yarn experienced in winding warp way.

"May I ask if you get better production than on warp?" requested the chairman. "Yes, sir," said Mr. Brietz, "there is an increase in production." "Did you get a better breaking strength?" continued Mr. Harris. "We think we do—we know we do, yes sir," said Mr. Breitz, explaining it by the elimination of the strain on the yarn. "It results in better weaving, slashing, and warping," he said.

"Did you get as many yards on the bobbin, and did it increase the cost of spooling?" asked J. A. Bangle, superintendent of the Proximity Mfg. Co., Greensboro. Mr. Brietz did not answer directly. He stated, however, that "the heavier the traveler you can run on warp, and the lighter on filling the better it is, and incidentally—we change travelers periodically. We would say that we get fully as much yarn on with the filling wind."

Thomas Bangle, overseer of spinning at the Proximity Mfg. Co., stating that he did not have filling wind, requested information from Mr. Brietz concerning the number of yarn, size ring, etc.

"In our mill we have two numbers only—we never change a number in the spinning room nor a pick in the loom—we have 26s warp and 29s filling, and we use a 1¾-inch ring, No. 1 flange, 7-inch stroke, spindle speed, 9.500 r.p.m.—we change the travelers every four weeks, by the calendar," responded Mr. Brietz.

Mr. Bangle stated that he runs coarser numbers—around 8s or 9s—and the chairman asked for experiences on this range of yarns.

Called upon, L. L. Brown, general superintendent, Clifton (S. C.) Manufacturing Company, said, "I tried filling build on a small number of frames with excellent results, on 13s. One of the most noticeable results was that on these frames, which are in the basement, and the mill is right on the river, we used to have, with the warp wind, an immense amount of waste on account of the yarn being moist and getting sticky. With the filling wind on warp the traverse runs faster and we have practically eliminated all that waste.

"We also put on filling build at another mill spinning 30s, and we are highly pleased with it. We have had it about two months and we find without changing the bobbin that we lack about ten minutes running as long as with warp wind, but as soon as we can change those bobbins then we can put more on."

CARL R. HARRIS, CHAIRMAN OF THE SPINNING DIVISION.

Asked by the chairman as to the weight of his travelers, Mr. Brown stated that on the 30s he used an 8-0 with the warp wind, but that when he went on filling wind he heavied up to a 6-0. He said that with the 8-0 traveler the filling wind doff ran thirty minutes shorter than the warp wind but that when he changed to the 6-0 this was reduced to ten minutes as he had stated.

W. F. Smith, overseer spinning at the Woodruff Cotton Mills, Woodruff, S. C., next made a statement: "We just have a small number of frames on filling wind," he said, "but we find we can get a better production, something like four turns per minute on the front roll. On the filling wind the spindle speed is 9,400 r.p.m., while on the warp it was something less than 9,000. At the increased speed our filling wind runs practically as good as the warp wind. This is on 30s yarn, with a 1¾-inch gauge frame.

"While on the floor," continued Mr. Smith, "I should like to ask about the cost of spooling. I think probably that we are getting the spooling at practically the same

cost with something like 20 or 30 per cent less waste." In response to a question from the chair he said he uses a 6½-0 traveler on filling against an 8-0 on the warp.

"Well, how about the spoolers," the chairman asked the meeting, "does it require as many spoolers?"

"No, sir," responded Mr. Smith. "The spoolers, on the warp, could run about 18 or 20 boxes, and on the filling they run 20 to 24 boxes. My spooler spindle speed on the warp wind was 600 r.p.m., on the filling wind it is 1,200; I just doubled the spindle speed on the spooler."

W. H. Brown, overseer spinning, Erlanger Cotton Mills, Lexington, N. C., said that he is "using the filling wind on 30s. We have a 1⅝-inch ring. Speaking of spooler cost, we get out with about the same cost on filling wind as on warp wind, with a saving of 25 per cent, but we have changed bobbins and we use a lighter traveler but that is because of the change in bobbins."

Mr. Brown said they increased the spooler spindle speed from 700 to 1,400 r.p.m. He said his work runs much better and that where formerly he could not keep up with ten spoolers he now uses only eight spoolers and keeps in line all right.

E. C. Gwaltney said that he had just changed over a mill of 18,500 spindles from warp wind to filling wind, on 30s/2 sale yarn. He said he does not get as much yarn on the bobbin, using the same bobbin; the doffers, he pointed out, just will doff them before they are full.

"On filling wind," explained Mr. Gwaltney, "it is not so difficult to fit the yarn to the traveler as with warp. On filling wind it is not so sensitive to a change in the number of traveler.

"Our spindle speed is perhaps ten per cent higher than on warp wind. Our production is at least ten per cent higher because we not only speeded up but we also took out some twist. The spoolers get off a little bit more work. But instead of 25 per cent saving in waste as some of these gentlemen mentioned, we don't get over 25 per cent of the waste we did before. The work runs good and the help are satisfied.

"It is impossible to get as much yarn on the same bobbin with the filling wind as with warp.

"I have speeded up the traverse," continued Mr. Gwaltney. "The traverse sprocket had 14 teeth in it and there was an idler sprocket with 7 teeth in it. We bored out that idler sprocket to fit the shaft and doubled the speed of the traverse. The quicker you get the traverse to go from the large part to the small part the better you can keep the balance."

"Then you run the traverse down fast and up slow," commented Mr. Harris.

David Clark, of Charlotte, brought up the variation in the style of bobbin being used in the southern mills for filling wind. "I was in the plant of a bobbin manufacturer," he said, "and he told me that he had made bobbins for several hundred southern mills and he did not believe any two of them adopted the same kind of bobbin—they varied all the way from the ordinary quill to a bobbin that tapered the other way.

"I know that the mills at Cramerton made lots of experiments along this line and they claim that they get the best results from a straight warp bobbin, while the Atherton Mills at Charlotte got 15 more revolutions on 40s using a bobbin that tapers slightly toward the bottom, the top end is slightly the larger. There doesn't seem to be any uniformity whatever, and it must make considerable difference."

In connection with this Mr. Gwaltney said that at one mill they once ran out of bobbins and had to use some old ones for filling wind that were an inch longer, and "we could not tell a particle of difference. The filling wind is much more flexible than the warp; you can balance the tension infinitely better."

Mr. Brietz requested at this point that Peter Quinn, of the Draper Corporation, be called upon for a statement in this connection.

"There is no question but that the filling wind for warp is better," responded Mr. Quinn. "You cannot put as much yarn on the bobbin if you use the same bobbin, but the thing to do is to change the bobbin, making it ¾-inch longer, using a smaller barrel, and thus put four doffs on three bobbins.

"You can regulate the traveler much better, the work runs much better, and makes stronger yarn, and it will weave better.

"At the spoolers you are supposed to put ten per cent more yarn on the spools, which will make it run better on the warper and also eliminate tangled work at the spooler. I would say in a mill running regular warp they ought to increase ten per cent. The great trouble seems to be in the spooling.

"On warp wind, you want about 2 to 2½ inches from the top of the bobbin to the guide wire on account of that rail coming up there but on filling wind you can run it up 1½ inches.

"Another thing—now you have warp spinners and you have filling spinners, while in adopting the filling wind for warp all your spinners can run any of the frames."

Mr. Quinn stated that in a mill using a 2 1/16-inch ring, where, on 13s, they had got 138 turns on the front roll with warp wind, they increased this to 152 revolutions with filling wind, and where the frames ran four hours on warp, with filling wind they ran 5½ hours, and the spooler hands spool from three to four boxes more on account of having more yarn on the bobbins. In his opinion, the filling wind bobbin should have a cone on the bottom; he explained that this would eliminate most of the breakages at the bottom right after doffing.

D. Frank Lanier, superintendent, Oxford (N. C.) Cotton Mills, asked if there would be any difficulty with kinks in the yarn, spinning 8s and 10s with standard twist, with the short stroke. "Of course," said Mr. Quinn, "if you get your stroke too short on coarse numbers it will kink, but if it was I, I would run the stroke longer. It will, it will sure kink, and there is another thing about it: in running the spooler twice as fast, that is a mistake. When they go to work and start the spooler up with nothing to hold it up there is nothing to stop it from kinking. It is one of the things you must educate your help to."

About the best speed to run the spooler, according to Mr. Quinn, is to speed it up about 30 per cent more than on the warp wind. Mr. Gwaltney said he agreed with Mr. Quinn's statements.

Mr. Brown, of Erlanger, said he had no trouble with kinks in increasing the speed of his spooler 50 per cent. He explained that he is on fine work, and Mr. Quinn stated that the kinks were more common on the coarser numbers as run by Mr. Lanier.

The next question asked by Mr. Lanier was: "We are making ball warps, and we find we can get 11,000 yards of 9½s single on a 4½ x 6 spool with the warp wind. Would it be possible to get that with the filling wind or would we have to change the spool?"

"I don't think you would have to change the spool," said Mr. Quinn. "You are supposed to put ten per cent more yarn on the spool with the filling wind. You do not put as much yarn on the bobbin at the spinning frame, but you do at the spooler."

Mr. Lanier said he had tried three or four different kinds of tension with the warp wind, but had thrown them all out, finding that he could get from a bobbin to a bobbin and a half more yarn on the spool with the old type of shuttle tension than with any of the new styles.

"We didn't run into any difficulties," said Mr. Brown, of Clifton, "and we did not have any more kinks, possibly because we did not speed the spoolers up. On 30s we are running them around 950. That is slow but we find we can keep up."

"We are not bothered with kinks," responded Mr. Smith to a question, "except those the spooler hand makes in tying up ends. We had to increase the spooler speed before we could get a firmer spool."

"Did you find any more fly around the spoolers?" asked Mr. Harris. "I did not notice any more," said Mr. Smith. Mr. Brown, of Clifton, said he did not have any extraordinary amount; not enough that it was noticeable. Another gentleman said that he had very much more. "A lot of leaf and trash comes off the yarn," he said. "I do not believe in carding on the spoolers, but a great many of us are doing it, especially on the rod on which the bobbin rests."

"Don't you think that in the old shuttle type that the spool turned and had a tendency to throw it off, while on the filling wind it holds it in its place?" asked one man.

"If you use a ball and a spring tension you will get more off the spring tension than with the ball," said Mr. Chapman. "I try not to card at the spoolers, but we usually do it."

The discussion was turned into a consideration of loose ends in warps by this question from Mr. Lanier: "About how many loose ends ought you to have on a ball warp 5,500 yards long, 420 ends? And in connection with this, what is the best band to use on a spinning frame to keep the soft yarn away?"

Mr. Harris suggested that the trouble was due to soft yarn caused at the spinning frame. Mr. Lanier explained that his spindles and rolls were in good shape and still the difficulty persisted.

"We have some loose ends in warps," said Thomas Bangle, "and as necessity is the mother of invention I invented something that is helping me out." He then explained that his warpers are equipped with an electric stop motion; that he put a roll right under the warp, and just as it comes out of the lease rack, the roll, which is covered with card clothing and driven from the main drive, catches any loose ends, drops down and forms a circuit thus stopping the warper. "Our spools are 5 x 6½, and we run iron skewers in the creel. My ends pulled in two considerably and to eliminate it I put that stop motion in there." He said his average is around three or four loose ends to the warp.

Mr. Moreland, of White Oak Mills, Greensboro, said they have some trouble with soft yarn, but that it is mostly in the spinning room, caused by new hands failing to put the bobbins down. "When we get a new hand in we explain about putting the bobbins down good," he said. "We try to keep the same banders on as long as we can." He said they run coarse numbers, 480 ends to the warp, 4,000 yards long. Mr. Bangle said he runs practically the same thing they do at White Oak, and here he was asked by Mr. Lanier about his loose ends. "We have I would say, three or four as an average," replied Mr. Bangle. "Sometimes we don't have any, sometimes they run up to six or sixteen, but from two to four would be the average. We put a lease in the warp every 500 yards."

The chairman at this point asked for methods of inspecting spinning bands. "It is an accepted fact," he said, "that with the tape drive there is less slippage and more even twist, but some of us have to run bands and will have to run them for a long time, and so I would like to have someone describe his method of inspecting bands to detect the loose ones."

Mr. Brietz says that about every thirty days he makes it a point to weigh about a dozen or fifteen bands to see that they are correct. He said the banding machine is under the carder, and that this is done by him about every month. He said that recently his bander had asked him whether the bands were not too large and that examination developed that they weighed exactly what they should although they seemed larger due to weather conditions.

"I don't go into detail like that," said Mr. Bangle, "but I inspect the bands on the machines about once every three months. The band machine is in my department, under me, and I make my bands out of the roving furnished me by the carder. Whenever we find a slack band we cut it off."

"How do you inspect the bands?" asked the chairman. "Do you try to stop the spindle?"

"We feel of the band," was the reply, "and if the tension doesn't feel just right, we take it off."

"Getting back to that soft yarn proposition," said F. C. Todd, superintendent, Ruby Mill, Gastonia, N. C., "I would like to ask if these troubles are in the form of soft lumps or is it just soft yarn in the form of raw cotton? Possibly I can help out." Mr. Bangle said his trouble is in lumps in the warps.

"A few years ago I had the same trouble," said Mr. Todd, "and it almost ran me crazy. I am on fine underwear yarn, 38s. We worked and worked for three weeks to find the trouble. Finally we got back to the card room, to the draw boxes on the combers. We had the Erman clearers; these clearers have a little comb on them that combs the clearer waste off. The combs had failed to work and these clearers, revolving, had picked up this short clearer waste and thrown it into the work. As you know, there is not a roll in the mill that will draw that waste out. We went back and put in new combs on our Erman clearers, and we eliminated that trouble absolutely. Now we watch these closely. I just throw that out to you so you might go back and look at the combers, or your draw frames, where you have these clearers, and you can perhaps eliminate the trouble by watching there."

Mr. Christley, of Spray, said he had had a good deal of trouble lately and had found it due to nothing more or

less than the top clearers on the spinning frames not being kept clean. He said he had experienced a great relief when he had these gone over, and that they are now kept clean.

"I know it will do that," agreed the chairman. "Some folks say it won't because of the rolls turning in the opposite direction, but I know it will."

"Our bands are inspected by competent men," said Mr. Lanier. "The overseer usually does it, by going along with the doffer and testing every bobbin by feeling of it to see if he can find any soft spots, and we do that about every two weeks, but still we have soft yarn.

"I would like to know about how long a band should run on a spinning frame making 9½s yarn, 2⅛-inch ring, 7-inch traverse, spindle speed 8,100, 176 revolutions of the front roll per minute. Mr. Bangle said he inspects his bands every three months. If I waited that long I'm afraid I wouldn't have any bands when I got around to it."

Mr. Moreland was of the opinion that a good band should run nine months. John Scott said he tested out some and that they ran eight months—these were ordinary roving bands.

"This band question is quite a problem," said W. L. Stoner, of Alta Vista, Va. "I made a test of this once, having some bands tied on by the same man, and some of them ran six months, some seven months and some a year, and on some of the frames I had then run less than a month. I do not believe you can establish a definite period of time. We have them running from three to twelve months. We run 50s, hard twist, on a 1⅜-inch ring, fast speed. I should say the life of a band would average seven months."

"On 18,000 spindles, warp, 30s yarn, I took the number of bands we tied on in one week, and it gave me an average life of three or four months," said Mr. Smith, of Woodruff.

"Was that a good week or a bad week?" asked Mr. Dilling. "Had it been raining or was it dry?"

"Well, it was two weeks ago," answered Mr. Smith. "The first part was real windy and the latter part of the week it rained. We had to put on three extra banders—for the whole room of 58,000 spindles, however."

In discussing the construction of bands, Mr. Moreland said they use a 2.00-hank roving, hard twisted, out of a short grade of cotton. "Our bands run from nine to twelve months," he said. "In making them we use five strands of 2.00-hank roving to the band."

"I haven't seen a soft bobbin in so long I wouldn't know what one would look like," said Mr. Brown, of Erlanger. "We make our bands out of 7.00-hank roving, eight-ply; with this we run in eight strands of 8s soft yarn run right in on the slubber with the speeder roving. It is all taken back and run through the slubber, using only the front rollers, and put on a slubber bobbin."

Following this discussion the morning session was adjourned, and at 12:45 o'clock the usual "Dutch" luncheon of the Association was held in the gymnasium of the Proximity "Y" building. David Clark acted as toastmaster, and after a palatable luncheon, Bernard M. Cone, president of the Proximity Manufacturing Company, and also president of the Cotton Manufacturers' Association of North Carolina, expressed in a few well-chosen words a welcome to Greensboro, and extended a cordial invitation for the visitors to inspect the plants of his company.

At the luncheon also a resolution of regret was adopted on the death of James David Hammett, president of the Cotton Manufacturers' Association of South Carolina, and an honorary member of the Southern Textile Association.

The Afternoon Session

was started immediately after the luncheon, and the first feature was the summarizing of the reports of tests made by members to determine the amount of variation on a spinning frame. Previous to the meeting Chairman Harris had sent out blanks upon which members were asked to record the actual figures on the weighing of every bobbon a spinning frame, furnishing information necessary, such as number of yarn, size of ring, etc.

The chairman read the results of these tests, and among those reported were the following:

On a 60s combed yarn, using 1¼-inch strict middling cotton, a twelve-hank roving, with 115 r.p.m. front roll speed, 1½-inch ring, 15-0 traveler, spindle speed of 10,500 r.p.m., tape drive, the variation showed 11.85 per cent. The highest number spun was 63.29s, and the lowest was 56.18s.

Another man, making 40s yarn, out of 1⅛-inch strict middling cotton, 8.33 hank roving, 9,200 r.p.m. spindle speed, reported a variation of 13.18 per cent, ranging from 38.02s to 43.29s.

Another report on 60s showed a variation of 15 per cent, from 65.36s to 54.35s.

A man on 30s warp, using 4.95 twist multiplier, 107 r.p.m. front roll speed (warp wind) and 110 r.p.m. (filling wind), with 8,813 r.p.m. spindle speed (warp wind) and 9,414 r.p.m. (filling wind), three-inch gauge frames, 1¾-inch rings, No. 2 flange ring, tape drive, 5.90-hank roving, 1-inch staple cotton, the high number was 32.26s and the low 27.78s, making a variation of 14.93 per cent.

A test of 128 bobbins on a 56s yarn shows a variation of 18.8 per cent total, with 6½ per cent below the number and 12.31 above.

A 22s warp, made from ⅞-inch cotton, with a 3.75-hank roving, with a setting of 1½ inch from middle to back roller, and 1 1/16 inch from middle to front roller, a front roll speed of 138 r.p.m., a 1 3/16-inch ring, No. 1 flange, ⅝-inch warp bobbin, 7-inch stroke on warp and 1½-inch stroke on filling wind, spindle speed of 9,763 r.p.m., showed a variation from 24.10s to 21.28s, or 12.74 per cent.

A 22s from ⅞-inch cotton, 4.32-hank roving, 130 r.p.m. front roll speed, 1¾-inch, No. 2 flange ring, 2-0 traveler, 9,400 r.p.m. spindle speed, band drive, 23.18 turns twist, showed a variation from 17.30s to 23.81s.

After presenting these results of tests, Chairman Harris recalled that at the spinners' meeting in Gastonia, "we spent some time in trying to locate the causes of this variation in yarns. We had a category of reasons from the picker room on through to the spinning room, but what we are interested in here today are those things within the spinning room that are giving us this trouble. Let us hear from some of you."

Mr. Dilling was called upon but said, "I have no ideas to suggest about the spinning room. I would like to say, however, that at the Spartanburg meeting we had a number of reports and as I recall it the variations ran up to 30 per cent. I believe the highest percentage reported

here this afternoon was 18 per cent which shows quite an improvement. The reports show much better than they did before, so it seems we are making progress."

"I would like to suggest in connection with these reports of variation that when we bring in the reports, let's not make them 'too good,'" said Mr. Gwaltney, who pointed out that if the accurate, true reports of what is actually considered a fair variation in all the southern mills could be secured, then the man who has contested a lot of yarn could offer this information as proof of the standard of the industry."

Mr. Lanier was asked for a statement. "I hardly know what to tell you," he responded. "We got up our report on variation but it was so bad that we were ashamed to bring it in. While our variation is bad we are trying to do all we can to overcome as much of it as possible. We have considerable waste that we put in the hopper at the opener room. We have changed the setting of beaters, reduced the speed, changed the drawing and also the slubber roller settings, and in the spinning room we are making an especial effort to keep out all skewers, etc., that are worn. We try to keep the spindles plumbed and in good shape, getting rolls in good condition and other things to get our numbers in keeping with the other fellow's so that we may be able to bring in a satisfactory report on our variation in the future."

"Mr. Lanier mentions several things that we spinners should remember," said the chairman. "It is not a hard matter to find our weight levers down on the guide board; all of us have bad skewers, probably we do not give as much attention as we should to our rolls—and all these things tend to make bad work. It is natural for us to pass the buck and we have been trying to pass it onto the carder—but if you will size from your roving in one place and find some high and low numbers, and then go over to another frame, keeping the bobbins separate, and try it on another frame, you can see if it is the roving or the frame that is giving you the bad work."

"I might say that in going through the card-room the other day I found the boss carder sizing at random," said Mr. Lanier. "Where he was supposed to be making a 1.35 hank roving he ran up to 1.40. I commented on the fact that the reports he gave me never showed that much variation, and he said no, that the sizings he gave me reports on were always made when the speeder was about two-thirds full."

Mr. Todd asked at this point what effect the variation in the cotton would have on the numbers. Giving his own experience in this connection he said, "I took some 1 1/16-inch cotton and made some 5.50-hank roving, and then I took some 1 3/16-inch cotton and made the same roving, and I took it to the spinning frame, and I had to put on a draft gear two teeth larger with the 1 1/16-inch than with the 1 3/16-inch cotton in order to get it to spin out on the numbers."

"I agree with Mr. Todd on what he says about the variation in cotton," said Mr. Thornberg. "I find in my experience there is a good deal in drafting long and short staple cotton. If you use a shorter staple cotton in behind your long staple you will have to heavy up on your draft to get the same numbers of yarn.

"As to the variation in the spinning room, of course it has a great effect on that because it is hard to get cotton all of the same cotton. If we mix our staple we must expect to have greater variation in our numbers than with uniform cotton."

"When we get a different staple cotton in the roving and it is delivered to the spinning room, then we cannot make even spinning," said the chairman, "but assuming that we have a good roving, what we want to find out here today is what are the biggest causes in the spinning room."

Mr. Stoner, of Alta Vista, made an interesting statement, saying that his back rolls are not weighted, his middle rolls are light, and his front rolls are the only ones that are weighted; thus, he pointed out, "there will be no weight levers on the creel boards, but we keep our middle rolls clean as we can. I take them right out once a week and wipe them off, we clean our front rolls every day to keep the lumps out of the work, the back rolls once a week.

"We also have revolving clearers, and I have thought of making these revolving clearers just a little smaller so as to just barely touch the middle roll. I have tried various things for breaking strength. I tried a real light middle roll but that did not help us any, and we did one thing that helped, by speeding up the middle roll two teeth we got a better breaking strength and according to our numbers and the twist—we run 50s hard twist,—we get as good a breaking strength as anyone could. I have run as high as 48 pounds breaking strength."

Mr. Lanier also stated that by speeding up the middle roll three teeth he gets a better yarn. "The builders," he said, "recommend one or two teeth difference in the draft. I have changed mine five teeth."

Mr. Gwaltney was also enthusiastic about the English system of dead weighting rolls. He said that by using this the staple of cotton might be changed possibly as much as ⅛ of an inch and a change in the draft would not be necessary. He stated that in a New England mill using this he had seen spinners on 80s running as many as 32 sides, and that in a room of 60,000 spindles he did not see but three or four ends down.

Mr. Vaughn also agreed as to the advantages of this system, adding that he had carried it back to the slubbers, intermediates, second intermediates and fine frames as well as the spinning.

At this point, Mr. Stoner's variation figures were read by the chairman, upon request. The first test, on 50s, showed a variation of 9.14 per cent from 47.62s to 52.91s, and the second test showed a variation of 3.4 per cent, from 51.81s to 49.76s.

In the mill he had previously referred to, added Mr. Gwaltney, which was in New Bedford, they are using the English dead-weight system, and are covering only the front roller, with a high-quality Persian lamb skin. They have the revolving clearers, also, he said, which were a great advantage as they eliminated fly off the rolls, and he explained this as a traversing roller that passes from one end of the frame to the other. This, he pointed out, is impossble with the weight lever.

Mr. Stoner explained that his was not the traversing type of clearer, but one that revolves in one position, the same as in mule spinning.

The problem of reducing variation in running colored numbers was brought up by Mr. Phillips, who said he will run through, say, a blue and a pink and a grey, with a

three-grain variation on the drawing, and will have a variation of a quarter of a number in the spinning. He wanted to know if this could be eliminated, and if so, how.

Mr. Gwaltney said the difficulty lay in the fact that some colors run better than others, due to the different kinds of dye making some softer and some harsher than others. He did not believe that the trouble could be entirely overcome.

"We find a difference in the numbers in very light colors," said Mr. Summey, of the Eno Cotton Mills of Hillsboro. "We have to open the rolls sometimes and change our drafts in order to get one color to draft whereas another drafts very easily. We have several colors in our mill and I find very frequently that we have a color that won't draft as good as another color. It seems to me that the dyestuffs makes one rough and another smooth." Mr. Black, of Lancaster, stated it as his opinion that the different kinds of dyes would have more or less of a tendency to take up different amounts of moisture. Mr. Long, of Clover, said he had found it to be due to heavy and light dyes.

Mr. Todd asked if anyone had experimented with the front roll covering. He said that at one of the meetings a man mentioned this, and he went home and took twelve rolls that varied in size at the two ends, and ran some yarn through, and then he took some rolls that did not have a variation in size and he found he got two per cent evener yarn.

"We have five mills and we have a roller covering shop," said E. M. Walter, Chadwick-Hoskins Company, Charlotte. "Our rolls are nearly all the same but after they are covered they are not, and I would like to have somebody tell me how I can get even skins. We know it is impossible to get the skins uniform. We have tried different skins and I have fought and cussed about it but we never get it. You will find a variation in any skin."

"Have you tried the English skin?" asked Mr. Gwaltney.

"Yes, sir, we tried the English skin and found it to be a very poor skin," answered Mr. Walter.

Mr. Clark brought out here that the annual roll covering bill of the southern mills is about $3,000,000, and that he understood that one manufacturer got $1,000,000 a year from the southern mills for roll skins. "It does seem to me that if a man is getting a million dollars out of the southern mills he could give some service for it," said Mr. Clark.

The method of taking two cots from the same place in the skin and thus having both skins on the roll uniform was suggested by Mr. Stoner.

The chairman here asked the question: "What is the roll cost per 1,000 spindles per week?" Mr. Chapman said he could not give it in cost, but that he uses 32 rolls per thousand spindles per week. Mr. Smith says he gives the section man a roll per frame per day. On 26,400 spindles, said Mr. Stoner, he uses about 650 rolls per week. Mr. Brietz said his cost was about $40.00 per week on 13,000 spindles.

In the opinion of Mr. Godfrey, of Danville, the question of rolls depends upon whether or not a mill has a good roll coverer; he said that if the man is on to his job and does the work correctly the spinner will not need so many rolls.

As to the English dead weight system as previously discussed, and the difference between the draft and break draft, Mr. Godfrey said that while the other men reported three and four teeth difference, that he uses six teeth difference; he said further that he has the middle and back rolls weighted. He continued, however, by relating a recent experience he had with the back saddle turned bottom side up and pointed out that this had quite an effect on the yarn variation.

L. L. Brown said he had found that hot calendering the rolls aided a good deal. Mr. Stoner expressed the opinion that the roll covering should be done under the supervision of the carder or spinner.

"How much roving waste do you have per thousand spindles per week?" asked the chairman, and answered his question by giving the following figures on 30s warp and 40s filling. On 59,316 spindles, he said, on 30s warp, the mill got 18 pounds of cut roving per week per thousand spindles. On 57,000 spindles on 40s and 42s, they are getting eight pounds of cut roving per week per thousand spindles.

Mr. Godfrey, emphasizing that in his room they do not cut off roving, but that they pull it off, said they get, in scavenger and roving waste together, a total of ¾ of one per cent per week. Putting through 36,000 pounds a week, Mr. Lanier said his waste, altogether, was 285 pounds, on 9½s and 10½s. Mr. Smith said that on 30s warp and 42½s filling, his waste, lap and roving, ran 150 pounds a day, putting through 9,000 or 10,000 pounds a day. This discussion concluded the meeting which was adjourned at 3:30 o'clock. Following the meeting quite a number of the men visited the Cone plants and other mills in Greensboro.

A new edition of "The Textile Fibers," by J. Merritt Matthews, Ph. D., has just been issued. This, the fourth edition, rewritten and enlarged, gives, in a systematic form, all of the material available for the study of the textile fibers. It is prepared to meet the needs of both the practical man in textiles and the student of textile subjects.

The author is well known to the industry, as former head of chemistry and dyeing at the Philadelphia Textile School; editor of the Color Trade Journal and Textile Chemist, and a consulting chemist of note. This book is the outgrowth of years of experience in both the teaching of textile chemistry and the practical observation of the many mill problems that have come under the notice of the author in the practice of his profession. Dr. Matthews emphasizes throughout the book the importance of the study of the fiber as an individual, for in many cases, it is pointed out, it becomes misleading to assume that the behavior of the individual fiber is identical with that of a large mass of fibers in the form of yarn or cloth.

Introduced in the present edition are several new features, making the volume up-to-date in considering the various fibers; for example, artificial silk, which has taken on new proportions since the publication of the first edition, is fully treated. All the major textile fibers are fully dealt with. The effective use of many fiber microphotographs in connection with the text matter lends value to the volume.

The book contains 1053 pages and 411 figures, and the price per copy is $10.00 net.

Human Relationships in Industry

BY W. M. McLAURINE.

"The Follow Up" and "Rating Help."

These two subjects are so closely related that they can well be discussed together. The purpose of projecting these topics is to impress upon the minds of the overseers the necessity for certain fundamental ideas in the discharge of these duties. We may emphasize the purpose in questions. What is the purpose of the follow up or inspection? What do you inspect? Why do you inspect? When you say one employee is good and another one poor, what do you mean? What is your concrete evidence? What constitutes good help? Is a non-technical rating system worth anything to you? What are some of the high points that should be considered in such a system? If we can succeed in getting the group to actively discuss these questions, I feel that it will be worth while. The following exposition and suggestions are made for the purpose of getting the leader into the line of thought which has proven beneficial in conducting this conference.

I have asked in every group in which I have done this work, "When you inspect or follow up, what do you do?" The answer nearly always is, "I look them over." "What do you look for?" is the natural twister that comes next. Some of the answers are recorded here.

1. Production—both quantity and quality.
2. Look in waste box.
3. Condition of machine.
4. Condition of floor.
5. Does he follow orders.
6. Attitude toward authority.
7. Attitude toward other workers.
8. Attitude toward work: (a) Is he working for production, or (b) Is he working to get by.
9. Does his head work.
10. Attitude of help toward him.
11. Does help need any instruction? If so, what?

There may be many more answers that could be given and should be given. There possibly may be other factors to be considered that are more valuable than these answers. It is not the purpose of the writer in these articles to give a detailed complete analysis for two reasons. First, what applies in one mill, might not, or would not apply in another; a second reason is, that the chief value of all of this work lies in the fact that the conference group acts in cooperation and expresses its own idea. I think it would be a splendid idea to record every suggestion made by any member of the group. There is a tendency on the part of the mind to grow mechanical and automatic. It is quite possible that in our "follow up" work all of us overlook something. Hence, I repeat, every supervisory detail should be thoroughly stamped upon the mind of the conference leader. Every man's honest opinion must be respected. It may seem simple and of no value at times, and again if we have not closed his mind with our indifference he may bring forth the most valuable idea on the subject under discussion. It might not be amiss here to digress for another piece of advice. Some people are timid and backward because they feel they are not educated in our formal schools and have not completed as many grades as they feel that others have. Some of the biggest hearts and best minds that I have met are found in the operating executive department of the cotton mills of Georgia. The University of Hard Knocks is a wonderful institution. It has the most varied and liberal courses of any university in the world. It has the greatest teaching staff, and enrolls every member of the earth at sometime as a student. The men in these conferences are either students or graduates of this university. Many great men are included in the alumni of this university. The diploma is not parchment with Roman inscriptions indited thereon, stamped and sealed with the great seal of the State. The diploma is written in human character, stamped with success and sealed with the approval and respect of friends and fellow workers. The alumni of this institution are called "Productive Citizens."

To go back and pick up the discussion, I am trying to let the group know that formal education is often not as valuable as practical experience. To show you again the importance I attach to the opinions of the group, there is scarcely an idea or opinion in this entire series of articles that was not developed with a group of overseers. After all of the points of supervision are brought out there may be thirty, forty, or fifty. Every member of the group will have an opportunity to silently check himself and see whether he has been properly discharging his duties in this respect.

A second step in the discussion is now possible, and nearly always provokes discussion. It is also a very valuable step. Take all of the points that have been brought out and arrange them in the order of their importance. What is the most important point in the follow up? Place that as number one, then take up number two and so on down the line. This again enables each man to find out the opinions of his fellow overseer, and he can agree, modify or reject these opinions as the case may be. A parenthesis can be made here to state that unanimity of opinion will never be present in this arrangement. Again, if this subject of arrangement were taken up at a later date without reference to present arrangement, a different arrangement would be made. Do not try to arrive too definitely on any of the discussions yet. The value lies not so much in arrival, but in discussion and agitation of the minds of the group.

If the group wants to have more fun and experience in this meeting, one hundred can be taken as a basis and then give a value to each of the follow-up points that have now been arranged according to their importance by the group.

This may seem carrying the discussion rather far and further development should be determined entirely by the wishes of the group. I have been with groups where this was desired, and where it was not advisable to take this step.

The world is full of general information; it is full of people who nearly know something; it is full of people who are nearly ready for work in its manifold needs. The world and particularly business needs people who have definite and specific information, and are ready for specific jobs.

It is in this spirit that I am making these suggestions in this series of articles.

I asked my boy one night why he loves me. He had an awful hard time trying to answer it. Finally, after much hesitation and brain agitation, he answered, "You furnish me food to eat, and give me money."

One day I walked into the big store of the Marshall-Field Corporation in Chicago. I wanted to make a small purchase. A man met me as I stepped in and I told him what I wanted. Immediately he told me definitely where to go in that big establishment to get it. He even told me the aisle and counter. I wondered what the man's salary was. In his head he carried the entire stock of Marshall-Field. He carried the store plan, floor plan, aisles, counters and location of all articles for sale. He had it ready instantaneously when need arose. Ask some of the people you know some test questions like this, and see how it goes. I expect your wife helps you find your hat every morning and always looks for your shaving outfit.

Definite information and opinions are what we are trying to stress. Not egotism or unchanging ideas, but a man who has arrived today. If it is necessary to redraft and revise tomorrow, do it. But, be where you can be located.

We have now some rather definite ideas on follow up. We had hazy ideas before, but they needed clarifying. We have arrived. We may change tomorrow, but arrive. We have some very definite ideas as to the value of these follow up points; we may change, but when we do, let's arrive at a definite opinion.

In discussing the second phase of the topic indicated in the caption, we may set up four objectives. (1) To show the practical benefit of rating help; (2) To fix on rating points; (3) To suggest methods of rating; (4) To impress upon the group that the rating record shows an employee's strong and weak points and thereby gives a basis from which to work toward making him a better employee.

In working out the first objective, this can be done by the conference method and results tabulated, as has been suggested before. The following statements are some of the benefits that have been developed in previous confernces. Rating help provides for intelligent routine promotion; provides for intelligent emergency promotion; makes up for lack of personal contact; substitutes records for memory; is an incentive to help. With these suggestions the group should be able to proceed and name other benefits.

The second objective, to fix on rating points, admits of a very broad and varied discussion. One author in discussing this subject said that only two points are necessary to consider, and these are attendance and production. Everything else that can be suggested, when finally reduced to its proper place will come under these two headings. Furthermore, the author said, if these two factors rated high he did not care very much about any other factors. Again, if other factors of value were considered in a rating chart and attendance and production rated high, all other desirable factors would rate high. I am not in a position to say. My experience again limits my ability to express a confirmation or negation of this. It would be an interesting study to make out a rating chart and include these two, together with other factors, and study the correlation. I believe that such a scheme as our author suggests would be adequate if all workers were good, or if it was our idea to eliminate all poor workers from our organization without any attempt on our part of trying to make them better. I am of the opinion that every progressive organization has growing material in it all of the time; it also gets in new material. If this is true, then the overseer or superintendent needs to have some method to check what this class of help needs or does not need in order to properly administer to them. Believing, as I do, that more than two factors are necessary in a rating scheme, I record herewith some of the suggestions that have been made: 1. Attendance. 2. Health record. 3. Production. 4. Care of his machine. 5. Operating skill. 6. Judgment. 7. Attitude toward orders. 8. Discipline. 9. Loyalty. 10. Intelligence. 11. Attitude toward fellow employees. 12. Initiative. 13. Education. 14. Village life.

Other suggestions should follow these.

It will now be necessary to arrange these in order of importance and then value them as was done on the "Follow Up Chart."

It might be well to review some of the records of previous meetings if they are available as a study of "Job Analysis" and "Follow Up Chart" will possibly throw some light on the solution of this problem. It would at least be a good business system to have them all harmonize and each one support the other.

There are nearly always promotions. Every really healthy organization has an internal growth. It was said once when one of the head men of the Marshall-Field Corporation died that this would necessitate the securing of a new office boy. All line men were promoted once.

Our opinions are so fickle and changing, records of some kind are necessary. Personal contact in a big organization is almost impossible, and yet some kind of a definite and reliable contact must be kept. Memory is not always dependable. In the great daily demands sometimes we forget. Records do not forget.

Again, if we do not rate our help systematically on definite lines we may often lose good help because of that fact. Our new help, which may have the possibility of developing into splendid first class help, may never have the opportunity of development unless the overseer has some method of checking what this class needs. This upgrading or vestibule system is a necessity for all successful industries. Many times a seemingly poor worker will have only one or two points, and these can be overcome by evidence and training. A rating system will show these deficiencies.

I can hear you say, "If I should do all of the things suggested in these articles, if I should keep all of the records and reports requested, I would have time for nothing else." To be perfectly candid now at the end of this chapter, I don't expect you to. I knew you would not when I started, but that does not prevent the idea from being good. It does not mean that because you have not the time, it is impractical. The ideas are regarded as good and practical by big business. I know you are busy and can't spare the time, so the next best thing to really putting into effect the ideas is to get you sold on the idea, to have you believe in them. If you have followed this far, whether you have a printed or written rating scheme or not, you have one in your mind, and will be guided by it from this time forth.

Cloth Analysis and Design

BY FRED A. CLOCK, M. E.

When laying out a design for a dobby pattern, the principal thing to determine is the character of the weave. If the cloth is to be similar to a given sample, the weave can be determined by picking out the sample or examining it with a pick glass. Aside from the weave much more information must be determined or assumed such as sley and picks, size of warp and filling, width of cloth, spread in reed, etc. Unless the work is done in a systematic way, there are many chances for error. The writer has found that the following system works well and if carefully followed will help greatly in eliminating error from the work. Although intended for the layout of cloth from a sample, it can be applied with slight alterations to original design.

Order of Analysis for Layout of Dobby Patterns.

1. Count sley and picks.
2. Count number of ends in each stripe, commencing with widest ground stripe and working from right to left.
3. Decide on sley reed.
4. Find number of dents in each stripe.
5. Make layout plan.
6. Find spread of warp in reed and number of patterns in width of cloth.
7. Mark start and finish on layout plan.
8. Figure total number of ends and dents.
9. Check total dents with number of dents figured from reed.
10. If necessary get details of weave.
11. Put harness numbers on details of weave.
12. Make harness draft on design paper.
13. Select cutting numbers from harness draft.
14. Make chain draft and be sure that all cutting ends cut.
15. Figure number of heddles required on each shaft and list same on harness draft.
16. Check number of heddles with number of ends in warp.
17. Figure weight of warp, filling and yards per pound of cloth.
18. Fill out data sheet.

We will now consider this analysis by number and in the order given.

One and Two.

Sections 1 and 2 need no explanation as all that is required is to count the ends and picks with a pick glass.

Three.

Sley reed may be defined as the sley of the cloth a reed will produce if two ends are drawn in a dent.

In fancy weaves the sley reed is usually determined by the sley of the ground and is often taken as the sley reed with two ends of the ground stripe in a dent. Sometimes this gives a reed so fine that it would cause chafing of the warp, in which case a coarser reed must be used and more ends drawn in a dent. In other cases the weave repeats on a number of ends which is not a multiple of two. It may then be desirable to use a reed in which the ends of a repeat occupy a full number of dents. This may be done to prevent reed marks. It also helps to prevent mistakes when drawing the warp in the reed. A warp repp which repeats on three ends is a good example. Two ends are drawn from one beam through an eye in one harness and one end from another beam through an eye in another harness. The three ends are then drawn in the same dent. In lenos, the crossing end and the ends around which it crosses must all be drawn in the same dent, as it is evident that the crossing end can not cross from one dent to another.

Four.

To find the number of dents in a stripe, measure the width of the stripe and multiply the width by one-half the sley reed.

Let a = Width of stripe in inches.
Let s = Sley reed.
Let b = Number of dents in stripe.

$$\text{I. Then } b = \frac{a\,s}{2}$$

To measure the width of a stripe, place the points of a pair of dividers so that the points just cover the stripe. Then measure the width with a steel scale graduated to hundredths of inches. If the warp in the stripe is crowded it is best to measure one dent over each side and deduct the two dents from the total number. Similarly, when measuring between two crowded stripes, it is best to measure two dents under the width.

Five.

A layout plan is a tabulation of the ends and dents in the various weaves of one repeat of a pattern. After making a layout add ends and then dents to find totals for one repeat of the pattern.

Six.

There are three methods of finding dents per inch, total number of dents and spread in reed.

First method. To find number of dents in reed, multiply the sley reed by the width of the cloth and divide by two.

Let s = Sley reed.
Let c = Width of cloth in inches.
Let e = Total number of dents.
Then,

$$\text{II. } e = \frac{s\,c}{2}$$

A rule often used to find the number of dents per inch in the reed is to subtract one from the sley reed, multiply by .95 and divide by two.

Let d = Dents per inch in reed.
Let s = Sley reed.
Then,

$$\text{III. } d = \frac{.95\,(s-1)}{2}$$

Formula III is fairly accurate in most cases but under some conditions gives erroneous results as contraction in width depends a great deal upon sley and picks, character of weave, relative size of warp and filling, etc.

Spread of warp in reed equals total number of dents divided by dents per inch in reed.

Let g = Spread of warp in reed.

Then,

$$\text{IV. } g = \frac{e}{d}$$

Second method. To find spread of warp in reed, assume a percentage of contraction and add the contraction to the width of the cloth.

Let e = Width of cloth in inches.

Let f = Per cent contraction.

Let g = Spread of warp in reed in inches.

Then,

$$\text{V. } g = (1 + .01f)e$$

Dents per inch in reed equal total number of dents divided by spread in reed.

$$\text{VI. } d = \frac{e}{g}$$

This method would work very well if the designer could obtain a reed with the exact number of dents that he desired and if he was sure that the contraction would be exactly what he had figured but he usually has a limited number of reeds to choose from and even if he could obtain the reed that he wanted, the chances are that the contraction would not be just what he had planned. It would then be necessary to change the reed if the sley of the cloth was to be absolutely right. While the sley would be so near that the difference could hardly be detected in one repeat of the pattern, it might affect the spread enough to change the width of the cloth. For this reason it is quite common practice to assume both dents per inch and spread in the reed and in case the sample does not come the right width, to change the spread only by adding or taking out ends.

Third method. Formula III may be used for finding the dents per inch in the reed. Assume a percentage contraction or a spread in the reed. Then the total number of dents equals dents per inch in reed times spread in reed.

Let g = Spread in reed.

Let d = Dents per inch in reed.

Let e = Total number of dents.

Then,

$$\text{VII. } e = dg.$$

To find patterns in width of cloth, subtract the selvage dents from the total number of dents and divide the result by the number of dents in one repeat of the pattern.

Let h = Number of dents in one selvage.

Let i = Number of dents per pattern.

Let j = Number of patterns in width of cloth.

Let k = Number of dents left over full patterns.

Let e = Total number of dents in width of cloth.

Then,

$$\text{VIII. } j = \frac{(e - 2h) + k}{i}$$

In other words, there are "j" full patterns with "k" dents left over.

Seven.

If there are dents left over a full number of patterns in the width of the cloth, it is sometimes hard to decide where to start and finish drawing in the warp. It is desirable to have the same width of ground stripe next to each selvage. The following rules will apply in most cases:

If the number of dents left over are more than the number in the widest ground stripe, subtract from the sum of the dents left over and the dents in the widest ground stripe, the dents in one repeat of the pattern and divide by two to find the starting and finishing points of the draft.

Let m = Number of dents in ground stripe.

Let b = Number of dents in one repeat of the pattern.

Let k = Number of dents left over full patterns.

Let n = Number of dents from edge of ground stripe to start and finish of draft.

Then,

$$n = \frac{k - (b - m)}{2}$$

$$\text{IX. } n = \frac{(k + m) - b}{2}$$

Start to draw "n" dents from left hand side of ground stripe and finish "n" dents from right hand side.

If the dents left over are less than the number in the widest ground stripe, subtract the dents left over from the number in the ground stripe and divide by 2 to find the starting and finishing points of the draft.

Then,

$$\text{X. } n = \frac{m - k}{2}$$

Start the draft "n" dents from left hand side of widest ground stripe and finish "n" dents from right hand side.

Eight.

To find the total number of dents, multiply the dents in one repeat of the pattern by the number of full patterns; to the product add the dents left over full patterns and the selvage dents.

To find total number of ends, multiply the number of ends in one repeat of the pattern by the number of full patterns; to the product add number of ends in dents left over and selvage ends.

Nine.

See that the total number of dents in the cloth figured from the layout plan check with the number figured by formula VII.

Ten.

If the weave is so complicated that it is impossible to tell what it is by examining the cloth with a pick glass, pick out and put down on design paper at least two repeats of the pattern.

Eleven.

Go over the layout and determine upon which harnesses the various ends of the pattern should be placed so that the cloth will weave best. Plain ends should usually be placed on the front harnesses as they weave tightest and the extra lift of the back harnesses will put too much strain on those ends. Ends that weave very loose should not be placed too far back unless several ends are drawn in the same dent in the reed. If the harness is too far from the reed, these ends tend to stay down when down and up when up in the shed and may give trouble by weaving under or over. However, if they are crowded in a dent, the reed pulls them up into the cloth and keeps them tight.

Twelve.

Show on design paper the harness through which each end is drawn in one repeat of the pattern. Show starting and finishing points and the ends in each dent. The rol-

lowing information should also be placed on the harness draft, style number, sley, picks per inch, width of cloth, length and number of dents in reed, number of ends in warp and number of heddles on each shaft.

Thirteen.

Note from the harness draft the ends that cut and tabulate same for reference when making chain draft.

Fourteen.

The first thing to do when making a chain draft is to indicate the harness numbers on the design paper. For a right hand chain start at the right hand side of the paper near the top and put down harness numbers for each vertical column of squares until all the harnesses are shown. For a left hand chain, start at the top left hand corner and put down numbers from left to right. Mark down on the design paper the weave of each harness as shown under details of weave. Start at the bottom and read up on the design and start at the top and work down on the chain draft. The number of picks in the chain must make a full number of repeats of the pattern and must be an even number equal to or greater than 16. The style number and number of bars in the chain should be given on the chain draft.

Fifteen.

To find the number of heddles on a shaft, count the number on the harness draft that are required for one repeat of the pattern, multiply this number by the number of repeats and to the product add the heddles required for that fraction of a pattern that is left over and the selvage heddles if there are any on that shaft. Tabulate the heddles for each shaft on the harness draft.

Sixteen.

To check the number of heddles with the number of ends in the warp as figured by 8, add the heddles on all of the shafts; count extra ends in one repeat of the pattern where there are more than one end drawn in an eye; multiply extra ends in one repeat by the number of full patterns; count extra ends in fraction of pattern left over full patterns. Add total number of heddles, number of extra ends in full patterns, number of extra ends in fraction of a pattern, and number of extra selvage ends. The total gives the number of ends in the warp and should equal the number as figured by 8.

Seventeen.

The weight of warp and filling are usually figured for 100 yards of cloth.

To find the weight of warp, add the percentage contraction to 100, multiply the sum by the number of ends and divide the product by 840 times the size of the warp.

Let r = Size of warp.

Let p = Per cent of contraction.

Let o = Number of ends in warp.

Let q = Pounds of warp in 100 yards of cloth.

Then,

$$\text{XI.} \quad q = \frac{o\,(100 + p)}{840r}$$

To find the weight of filling, multiply the spread in the reed by the picks per inch and divide the product by 840 times the size of the filling.

Let g = Spread of warp in reed.

Let t = Picks per inch.

Let u = Size of filling.

Let v = Pounds of filling in 100 yards of cloth.

Then,

$$\text{XII.} \quad v = \frac{gt}{840\,u}$$

The weight of yarn in 100 yards of cloth equals the weight of warp plus the weight of filling.

The yards per pound equal 100 divided by the weight of warp plus the weight of filling.

Let y = Yards per pound.

Then,

$$\text{XIII.} \quad y = \frac{100}{q + v}$$

Eighteen.

Printed data sheets with blank spaces for the following information should be provided and after a design is completed should be filled out and filed for future reference. The information to be placed on the data sheet is date, style number, width of cloth, picks per inch in ground, average picks, ends per inch in ground, average sley, number of ends on first, second and third beams, size of warp on first, second and third beams, pounds of warp per 100

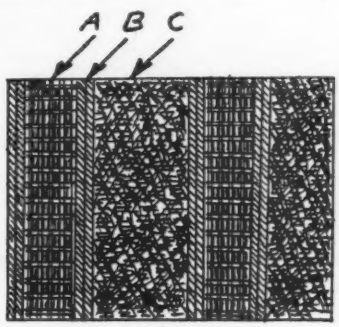


Fig. 1.

yards of cloth on first, second and third beams, total number of ends and total weight of warp for 100 yards of cloth, size of filling and pounds of filling for 100 yards of cloth. Pounds of yarn in 100 yards of cloth, yards of cloth per pound, sley reed, length of reed, dents in length, dents per inch, and dents used, number of harnesses, number of patterns, selvage dents and ends, number of ends in one repeat of the pattern and number of dents in one repeat of the pattern and description of cloth.

Filing.

After a design has been completed the data sheet should be carefully filed for future reference. The following system of filing will be found advantageous if carefully followed. As soon as a sample has been woven and accepted make changes if any are necessary in the harness draft, chain draft and data sheet. Have on hand pieces of good quality, thin cardboard, 8½ x 11 inches. In the right hand upper corner of one of them place the style number, sley and picks and width of goods. Below this paste a small sample of the cloth and below the cloth paste the data sheet. To the left hand side, fasten with paper clips copies of harness draft, chain draft and details of weave. File in a letter filing cabinet.

Figure 1 represents a sample of cloth made up of a carded stripe A, a four-end broken satin stripe B and a

crape ground C. The cloth required is to be similar to the sample, 37 inches wide and 4½ yards per pound. Taking the different steps as outlined under order of the analysis:

1. Counting ends per inch and picks with a pick glass, there are found to be 64 sley x 68 picks per inch in the ground stripe C.

2. Counting the ends in each stripe, there are, in stripe C 44 ends including 2 plain ends next to the satin stripe on each side. The stripe B is made up of two, four end broken satin stripes with two plain ends between them. The stripe A contains 32 ends weaving fancy and 2 ends on each side weaving plain which makes 36 ends in all.

3. Since the sley of the ground stripe is 64 and there is no good reason for drawing more or less than 2 ends in a dent, a 64 sley reed should be used.

4. Measuring the width of the stripes, ground stripe C is found to be .62 inches wide measuring 2 dents under the width. B is .15 inches wide measuring 2 dents over the width and A is .26 inches wide measuring 2 dents under the width.

Substituting in formula I.

For stripe C, $b = \frac{.62 \times 64}{2} = 20$ Dents $20 + 2 = 22$ Dents

For stripe B, $b = \frac{.15 \times 64}{2} = 5$ Dents $5 - 2 = 3$ Dents

For stripe A, $b = \frac{.26 \times 64}{2} = 8$ Dents $8 + 2 = 10$ Dents

Second stripe B 3 Dents

Total number of dents in width of pattern ..... 38 Dents

Width of pattern = 1.187 inches.

Measure the overall width of the pattern on the sample to see that it checks.

5. Since there are ten ends in the satin stripe including the two plain ends between the stripes and the ten ends occupy 3 dents, they must be drawn with 4 satin ends in a dent and the two plain ends in a separate dent. The corded stripe is drawn with 4 ends in a dent and the ground stripe with two.

Layout Plan.

Ends	Dents
2 { 4	1 { 2,
40 { 32	20 { 16,
2 { 4	1 { 2
4	1
2	1
4	1
2	1
32	8
2	1
4	1
2	1
4	1
100	38
30	30
3000	1140
48	12
68	22
3116	1174

6. Using the third method for figuring the reed and

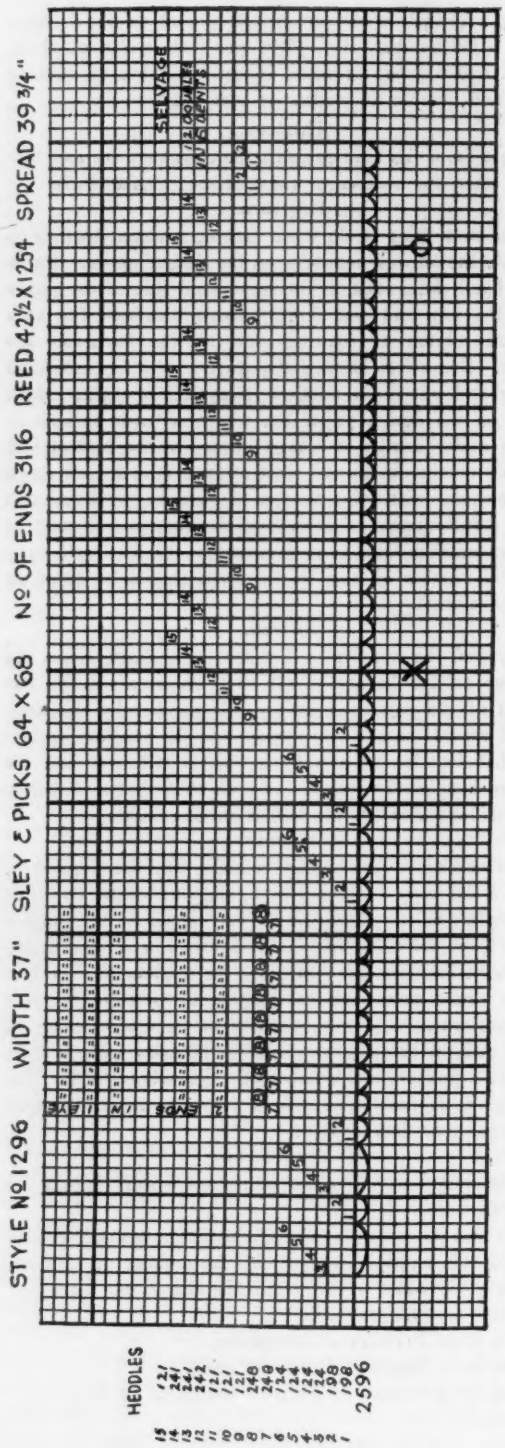


Fig. 3

formula III. for estimating the dents per inch.

$$d = \frac{.95\ (64 - 1)}{2} = 29.9 \text{ dents per inch.}$$

On investigation it is found that there is a reed available which is 42½ inches long and contains 1254 dents or 29.5 dents per inch. Although a little coarser than estimated it will be satisfactory.

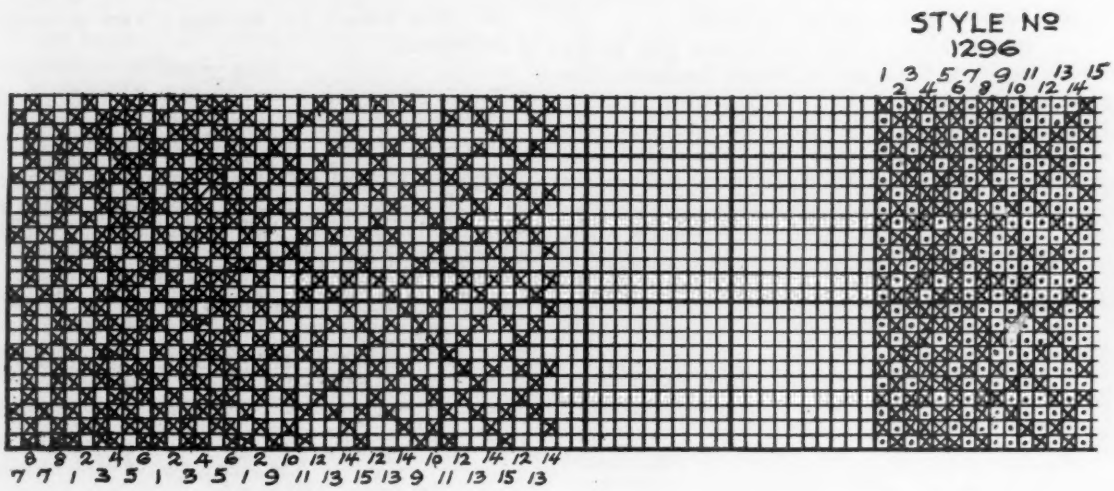


Fig. 2

Fig. 4

Assuming 7 per cent contraction, the spread in the reed figures 39.6 inches. In order to have even quarters, make the spread 39¾ inches. From formula VII.

$e = 39.75 \times 29.5 = 1173$ dents.

Make selvage with 12 doubles in 6 dents. From formula VIII.

$$j = \frac{1173 - 12}{38} + k \text{ dents} = 30 \text{ patterns } 21 \text{ dents}$$

or = 30 patterns 22 dents in order to have an even number of dents left over the full patterns.

7. Since the dents left over are more than the number in the ground stripe, formula IX. should be used to find the starting and finishing points.

$$n = \frac{(22 + 20) - 38}{2} = 2 \text{ dents.}$$

"X" indicates the starting point and "O" the finishing point on both the layout plan and the harness draft. Reading from top to bottom on the layout plan is the same as reading from right to left on the harness draft.

8. The total number of ends and dents are figured at the bottom of the layout plan.

9. The number of dents figured from the spread in the reed was 1173 which checks with 1174 figured under 8 as one dent was added in order to make the number left over full patterns even.

10. In a great many cases it is not necessary to pick out cloth to determine the character of the weave as a person who is familiar with fancy weaves can recognize them by examining the cloth with a pick glass. In some cases however this is impossible and it is necessary to pick out a small piece of the cloth. In the sample it would be very hard to tell how the crape weaves without picking it out.

STYLE NO. 1296				DATE Jan. 31, 1924
WIDTH OF CLOTH 37"	ENDS PER IN.-GROUND 64			AVERAGE SLEY 84.22
	PICKS PER IN.-GROUND 68			AVERAGE PICKS 68
WARP	NO. OF ENDS	SIZE	LBS. PER 100 YDS. OF CLOTH	
1ST. BEAM	3116	32 8	12.75	
2ND. BEAM				
3RD. BEAM				
TOTAL	3116		12.75	
FILLING		34 8	9.45	
YDS. PER LB. 4.5	LBS. OF WARP & FILLING 22.20			
SLEY REED 64	LENGTH 42½"	DENTS IN LENGTH 1254		
DENTS PER IN. 29.5	DENTS USED 1174		SPREAD IN REED 39¾"	
NO. OF HARNESSES 15	SELVAGE DENTS 6		NO. OF ENDS IN REPEAT 100	
NO. OF PATTERNS 30+22	SELVAGE ENDS 12 doubles		NO. OF DENTS IN REPEAT 38	
DESCRIPTION OF CLOTH Broken satin and corded stripes on crape ground.			NOTES	

Fig. 5

The details of the weave are shown in Fig. 2.

11. Crapes usually weave well so that part of the pattern has been placed on the 7 back harnesses. The plain ends have been placed on the two front harnesses. If placed on harnesses 3, 4, 5 and 6 the satin ends make a straight draft with the plain ends. The corded stripe should weave about the same as the satin ends and has been placed on harnesses 7 and 8. It will be noted that harness No. 6 weaves the same as No. 8. The ends have been placed on different harnesses in order to avoid a broken draft.

12. The harness draft is shown in Fig. 3.

13. The cutting numbers are 1-14, 2-9, 1-8, 2-7, 2-3 and 1-6.

14. The chain draft is shown in Fig. 4. Checking the cutting ends on the chain draft, it is found that they all cut.

15. The number of heddles required for each shaft are listed on the harness draft.

16. The total number of heddles required is 2596, adding 496 extra ends for the corded stripe and 24 for selvage makes a total of 3116 ends which checks with the number as figured under 8.

17. From formula XI., assuming a warp contraction of ten per cent.

$$\text{Pounds of warp, } q = \frac{3116 \times 110}{840 \times 32} = 12.75 \text{ pounds}$$

per 100 yards of cloth.

Since 4.5 yards of cloth weighs one pound, 100 yards will weigh 22.2 pounds. $22.2 - 12.75 = 9.45$ pounds of filling per 100 yards of cloth. Substituting in formula XII. and solving for u,

$$u = \frac{39.75 \times 68}{840 \times 9.45} = 34\text{s filling.}$$

To check the size of filling, substitute 34s in formula XII. and solve for v.

Then,

$$v = \frac{39.75 \times 68}{840 \times 34} = 9.46 \text{ pounds per 100 yards of cloth.}$$

$9.46 + 12.75 = 22.21$ pounds per 100 yards of cloth.

$100 \div 22.21 = 4.5$ yards per pound.

18. Fig. 5 shows the data sheet after having been filled out.

Machine Calico Printing

BY WILLIAM B. NANSON.

The Doctors.

The "doctor" exercises a very great influence for good or evil in calico printing, and as its sharpness and angle of inclination to the copper roller varies with the styles of work in hand, it requires an expert to sharpen it properly, and considerable practical experience to know exactly what qualities it should possess in any given case. In order to prevent the doctor from wearing irregularly, it is given a to and fro or oscillatory motion so that it is constantly changing its position and is never in contact with any one point of the engraving for more than a fraction of a moment at a time.

The management of the doctors therefore makes perhaps greater demand upon the skill of the printer than any other branch of his work. As previously mentioned, there are two kinds of doctors—the "cleaning" doctor and the "lint" doctor. The use of the former is absolutely essential in every case, but the latter may be dispensed with, or not, at the discretion of the printer.

The blades of a "cleaning" doctor are made from the best quality of medium tempered steel. They may be of variable widths and thicknesses or from two to three inches wide and from 1/16 to 1/32 of an inch in thickness; the length should be about two or three inches longer than the copper printing roller. The working edge, which rests on the roller, should be filed to a suitable bevel and then sharpened—preferably with an oil stone—to a fine razor edge; the bottom edge is firmly clamped between two sheaths, usually brass and iron, and these are tightly screwed together and are furnished at each end with a supporting pivot which rests in a bracket attached to the bearing of the printing roller, and a projecting lever; this lever, by means of weights or screws, serves to press the doctor blade firmly on the engraved printing roller. The construction of these levers vary according to the place occupied in the machine by their respective rollers, some being simple and some of them compounded.

In order to prevent the unequal wearing of the doctors' edge, which would surely occur if they were allowed to rest continuously in one position on the printing roller, the cleaning doctor is given a slight reciprocating motion in a direction parallel to the axis of the roller. This movement is carried out by means of the "traverse motion" which consists of a connecting rod attached to one end of the printing roller to a pin on the doctor sheaths, and at the other to a small crank or eccentric situated at the side of the machine and worked by bevel gearing.

In large machines of modern make the connecting rod is coupled to an oscillating lever, one end of which works in an undulating channel cut in the circumference of a solid iron disc fixed on the axle of the pressure cylinder and revolving with it, When this latter arrangement is adopted, the disc is frequently made to slide backwards and forwards on its axle, a device, which, by constantly varying the "throw" of the doctor, adds to its efficiency, especially when printing broad stripes, where the width of the engraved pattern is greater than the "throw" or traverse of the doctor.

"Lint" or "composition" doctors are made of brass or some other similar alloy and they remain stationary, not being fitted with any traverse motion. It sometimes happens that certain colors are affected by traces of iron owing to their solvent action on a steel doctor; in such cases a "lint" or "composition" doctor blade is used as a cleaning doctor, though at the present time this is rarely done on account of its unsuitability for the purpose—a composition metal being too soft, and difficult on that account to keep sharp, then again the improved color pastes which are usually used are made generally in such a manner that they have no dissolving or corroding action on

the steel doctor, this, of course, renders a composition cleaning doctor unnecessary.

Probably the most difficult, as it is the most important part of a machine printer's work, is the sharpening or "getting up" of the edge of the "cleaning" doctor. It is an apparently simple operation but it demands for its proper performance an amount of skill that can only be acquired by long practice and a fine and thoroughly experienced judgment regarding the edge required for different classes and styles of printing and engraving. It is not possible to lay down any definite rule for the production of any edge that would be best suited to a given style of work, for this would depend not only upon the depth and scale of the engraving, but also upon the thickness and hardness of the metal itself, also upon the angle at which it is applied to the printed roller and the pressure applied to it, and also upon the viscosity and adhesiveness of the printing paste which it has to scrape off. Moreover, machine printers vary materially in their ideas as to what is the best practice and treatment of doctors, even for the same class of work; each man has his own "hobby" or method which he thinks infallible because it has, at his hands, yielded the best results. Speaking in a general way it may be said that the edge of a well-sharpened and got-up doctor should be perfectly straight and absolutely smooth throughout its entire length; it should also be beveled to a rather obtuse angle and finished up as sharp as a razor. If there is any roughness, unevenness or the slightest abrasion in the edge it will allow the color to escape by it and the ultimate result will be that the finished goods will be full of streaks and cloudy patches of color. There is another point which needs the printer's careful consideration as it has quite an influence upon the proper working of the doctor and also upon the durability of its edge, and that is the angle at which it is applied to the printing roller; but this point, like its sharpening, is largely a matter of experience and practice, and no amount of written description can possibly convey an adequate idea of how much it varies under changing circumstances.

Regarding the filing and getting up, the "lint" doctor is a comparatively simple matter; it is only necessary to make it sharp enough to catch the lint and loose threads and the color that the cloth deposits upon the printing roller. It may as well be said, however, that a lint doctor is not required to press as sharply on the printing roller as a cleaning doctor—that is to say, it should take up a tangential rather than a radial position. One reason for this is, that the printing roller revolves toward (or against) the edge of the lint doctor; now if the lint doctor is set at too sharp an angle, it is liable to dip into and tear up the engraving; this scratching up of course damages the roller for the time being and often entails the necessity of turning off the pattern and the re-engraving of a new roller.

Lapping.

The lapping used for covering the pressure cylinders of printing machines is a specially made fabric, with a linen warp and a worsted filling. It can be had in different weights, suitable for different styles of work and it should be of the best quality both as regards materials and manufacture, so as to enable it to successfully resist the enormous pressure and the grinding action to which it is subjected during the printing operation. In most cases, eight to twelve thicknesses of lapping are wound around the cylinder and great care must be taken to see that every thickness is laid on perfectly even and is absolutely free from all wrinkles or creases.

Should the lapping be in several pieces the ends of each piece must be frayed out for about two inches of its length and then carefully straightened out quite flat so as to avoid leaving a ridge when the other pieces are wound over them. The slightest wrinkle or inequality of any kind occurring in the lapping is enough to spoil a great number of yards of goods unless it is promptly discovered, and this is not always an easy matter, especially when mordant colors are being printed as these colors do not show up until they are dyed or steamed or otherwise developed *after* printing. The importance, therefore, of putting this lapping on smoothly and evenly at the outset is more than obvious, and further than this it is fairly obvious that it should be examined from time to time to see that it is keeping in a good, smooth, condition.

It will be seen, therefore, that the skill and experience of the machine printer may be shown as much, perhaps, in the care he takes of his lapping as in the filing and sharpening and ultimate setting of his doctor blades.

If the lapping is put on too slackly it very soon slips, and if not rewound at once it will break across its whole width and must then be taken off and new lapping put on. After new lapping has been run for some little time it stretches very materially and requires re-winding.

I may say that *all* lapping requires to be changed at frequent intervals, according to its condition. The longer the lapping is worked, the harder and less elastic it becomes, therefore, if the style of pattern for which the cylinder was originally lapped remains the same, the lapping must be changed, otherwise the quality of the printing will not remain the same. As a rule, if the lapping is in good condition, except that it may have become hard and inelastic from long use for heavily engraved patterns, it is not necessary to change it at once because (if it is smooth) it can be used for printing lighter and more delicate patterns, the details of which are printed much more clearly and distinctly on a fairly hard lapping than on one that is elastic enough for bolder work. A great deal of valuable time may be saved in a printworks by watching this point for it is slow work changing lapping and while it is going on the machine of course is producing nothing.

The quantity of lapping to put on for a given style of work and the knowledge about when to change it can only be taught by experience, and on these points the ideas and the practice of machine printers vary almost as much as their ideas of handling the doctors.

It may be said, however, in a general way, that the finer and more delicate the pattern to be printed the smaller the amount of the lapping to be required and the harder and more compact it must be; but for heavy designs, deeply engraved, a large quantity of a soft thick, openly woven quality of lapping is necessary, especially in cases where the color is required to penetrate through to the back of the cloth. On the other hand, if the lapping be hard the great pressure necessary to obtain a good impression of a heavy design would force all the colors (except the last one) of a multicolor pattern too deeply into the body of the cloth and spoil their brilliancy or "face" as it is technically termed.

The lasting quality of the wear and tear of any make

or quality of cylinder lapping is governed of course by many factors, but insofar as it depends upon the care of the printer, it is governed by the manner in which it is wound on the cylinder. If it is not wound on tight enough the great pressure will cause the different thicknesses to slip about on each other all the time and the result will be that this continued grinding motion will gradually wear them out. The quality of the work depends, among other things, upon the lapping being of uniform elasticity and density throughout and of a smooth, unbroken surface, and the machine printer must use the utmost care to see that these qualities are not injured by the passage of any hard substances between the lapping and the rollers. When a nail or other hard solid substance falls into the machine from any cause it may possibly cause a great amount of damage to both the printing roller and lapping.

Blankets.

The blankets used on the cylinder printing machine call for the most careful attention on the part of all printers who desire to excel in the production of nice work. One of the chief causes of trouble in calico printing will be found to be the dirty condition of the blanket. After long use the blanket gets very dirty and must be changed, for it is practically impossible to clean one made from cotton and wool, and therefore it must be replaced by a new one, and new blankets are a costly luxury. The ordinary printer's blankets consists of from 30 to 50 yards of a thick woolen fabric tightly woven and afterward shrunk and felted. Like the "lapping" it must be of uniform texture and of equal thickness and elasticity throughout.

The business of the blanket is to increase and assist the effect of the elastic pressure afforded by the lapping, and in furtherance of this it is so arranged that it circulates continuously—while the machine is printing—around the cylinder between the lapping and the cloth to be printed. When putting it on the machine, therefore, its ends are sewed together so as to convert it into an endless traveling web. It must be sewn together in such a way, however, as to leave no suspicion of a ridge at the seam; to accomplish this the two ends are first cut perfectly square and are then placed in contact with each other and flush with each other and are then sewn together with fine, strong, silk thread, the stitch that is used being usually a sort of herringbone stich which crosses and re-crosses the seam at short intervals, and makes a joint sufficiently strong to resist the working tension of the blanket.

When properly sewn a blanket seam ought to leave no evidence on the printed cloth of its passage through the machine; if, however, it is in any way rough or uneven, these defects are at once demonstrated by the appearance of a light colored mark right across the whole width of the cloth at every revolution of the blanket. In the course of time the blanket becomes hard and soiled from the combined pressure of the printing rollers and the wet color that penetrates through the cloth, and must then be turned over or replaced with a new one. By using judgment and care and by the use of "back greys" a good blanket can be made to last for the printing of 10,000 to 12,000 pieces of calico, and even then will be in a favorable condition to withstand washing, after which it may be used again for certain styles of work that are easy on the blanket.

Rubber Blankets.

At times, and in some printworks, rubber blankets are employed in conjunction with the usual calico printing machine. The rubber blanket is composed of three or more layers of fine evenly woven calico of good quality, cemented together with a solution of India rubber in naptha. It is the outcome of many attempts made to replace the expensive woolen blanket by one that would be equally efficient and at the same time much cheaper; and although it is not a perfect substitute, it is so generally useful that in some works it is employed to the total exclusion of the costlier woolen blanket.

Rubber blankets are found in two different forms; one of these requires sewing in the usual way, and the other is a seamless blanket. The latter comes into the market as a single piece of cotton cloth, three or four times the required length of the blanket and coated on both sides with a special preparation of India rubber, which is neither sticky nor hard and dry, but just sufficiently "tacky" and adhesive to cause the several layers of the cloth to adhere firmly to each other, without any chance of slipping when pressed together tightly in the printing machine. It would be impossible to describe in detail the way of putting on this seamless blanket without a practical demonstration.

Rubber blankets can be used for the strongly alkaline colors that play so important a part in modern calico printing; this gives them a decided advantage over the woolen blanket as the latter would become rapidly destroyed by the alkali and are therefore unsuitable for such colors. Another advantage of the rubber blanket is that it can be washed *in situ*, that is, while the machine is running, the washing machine is arranged at the back of the printing machine and acts continuously upon the blanket so that the latter always enters the machine entirely clean and free from dried on color.

Rubber blankets can be recommended to the calico printer for use in the printing of fine patterns and shallow engraving; but although suitable for nearly all classes of work, it is better to use a woolen blanket when heavily engraved designs are to be printed and in all cases where a large quantity of color is required to penetrate deeply into the fabric.

Washing Blankets.

The use of blankets that can be washed *in situ* has been on the increase these latter years. This is probably due to the many improvements recently made in the style of washing machine and its application, and partly to the fact that cheap and serviceable blankets which will stand the extra strain due to washing can now be obtained; most of these blankets are made from a single thickness of strong cotton cloth made waterproof in various ways, and strange as it may seem they wear better than a three- or four-ply rubber blanket.

For some styles, good work has been accomplished by a single grey piece to which a solution of wax has been applied, but it is better to use a stronger and thicker fabric than this. A strongly woven fine canvas of the best quality may be waterproofed by being passed through successive baths of soap and alumina and then treated in a solution of casein and dried and then steamed in an atmosphere of formalin and finally calendered. This makes an excellent blanket and is very durable. These cotton blankets can

be materially improved by mercerizing followed by the above treatment or by any of the waterproofing methods in which alum, soap, or wax or casein are used, either separately or in conjunction with each other.

There are many types of blanket washing machines in the market, but most of them are based upon the same principle of subjecting the traveling blanket to the scrubbing action of revolving brushes in conjunction with a copius supply of water applied to the blanket through the medium of "spurt" pipes. (See Figure 1.)

The straight lines in Figure 1 represent the traveling blanket and the arrow marks point the path of the blanket from the pressure cylinder of the printing machine to the final drying cylinder. *A* is a large brass cylinder which revolves in the same direction as the blanket and the arrow; *B, B* are revolving brushes which scrub the blanket as it passes around the cylinder *A; D, D* are spurt pipes which spurt water on the blanket; *C, C* are squeeze rollers which

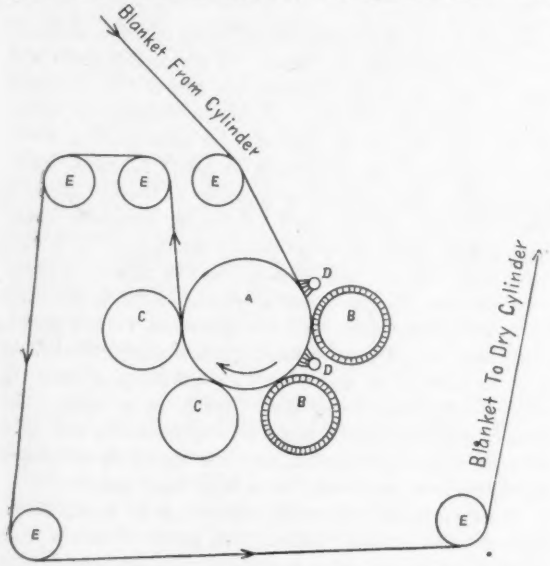


Fig. 1

squeeze out and remove the water from the blanket. *E, E, E, E, E* are guide rollers which simply carry the blanket on its way to the drying cylinders.

While in some types of blanket washers the blanket passes around a revolving copper cylinder against which the brushes are pressed as shown at *A* and *B, B* in Figure 1, in others the brushes work against a slab of slate over which the blanket is drawn, then again in some of the simpler forms the blanket itself simply rubs over the brushes but in every case "spurt" pipes are used to flush the blanket at a good pressure and the excess of water is afterwards pressed out by means of squeeze rollers, between which the blanket passes on its way to the drying cylinders, as shown in Figure 1, from which it re-enters the printing machine with the cloth to be printed.

One of the principal advantages of washing blankets, aside from their economy, is that they always present a clean, dry surface to the back of the cloth and in consequence of this fact, the use of "back greys" is not necessary and they may be dispensed with because the blanket being non-absorbent the colors are easily removed by washing with cold water.

As the cloth and the blanket pass over to the printing machine to be printed, it is watched carefully by the "back tender," a competent young man who is often an apprentice to the machine printer. It is his duty to watch the back of the machine and to keep the cloth, blanket, back greys, etc., smooth and free from creases or wrinkles. When he notices anything irregular in the condition of the cloth or the machinery he notifies the printer in the front of the machine. It will be obvious that if the cloth be allowed to proceed to the printing rollers is a creased condition the result would be unprinted streaks in the design on the cloth and therefore the smoother the condition of the cloth as it travels past the rollers, the better will be the printing, so that it will be seen that the "back tenders" discharge some quite important duties; while their work is monotonous and looks comparatively easy, yet it calls for a very considerable amount of intelligent watchfulness.

Back Greys.

Back greys are pieces of unbleached cloth that run between the cloth to be printed and the blanket for the purpose of protecting the latter from any color paste that may be driven through the former. When woolen or ordinary rubber blankets are used they are essential, but where the washing blankets are used they may be dispensed with, though they are sometimes used, even in the latter case, for certain styles of patterns.

These back greys, after becoming too dirty for further use, are sent to the bleachhouse and strongly soured in muratic acid to discharge any metallic salts that may have been used in the various printing pastes and also to soften up and dissociate the thickening agents which they contain. They are then bleached in the ordinary way and used for printing into ordinary calico.

Great difficulty has been experienced in removing the various coloring matters which have become printed upon the back greys, particularly at their edges, especially where vat colors have been used. This difficulty has been largely overcome by an improved process invented by E. Bentz; this invention consists in the use of various aralkyl compounds along with the usual liquors or lyes of milk of lime or caustic soda and sodium carbonate, and with or without reducing agents. One example of the application is as follows: A kier load of three tons of stained back greys is first well washed and boiled with milk of lime, then washed and soured in hydrochloric acid. It is next boiled with the usual proportion of caustic soda lye to which 20 pounds of dimenthylphenylbenzylammonium chloride, 10 pounds of glucose and 10 pounds of anthraquinone paste of 30 per cent strength have been added before heating the liquor. The boiling process is carried out as usual and the calico is after-treated with hypochlorites (chemicked and soured) and finally washed and dried.

Cloth that is intended subsequently for alizarine (madder) colors should never be used for back greys on account of the difficulty of removing the metallic mordants entirely from the goods, the least trace of which will show up when the goods are dyed.

"Bump" is a name applied to a cloth that is set apart especially for use as "back greys" and "bump greys" are always used as far as possible in the printing of colors that are either very difficult to bleach out or that affect the cloth in other irremediable ways—such colors, for instance,

as aniline black, indigo blue and the alkali discharges used for tannin mordanted cloth and Turkey red.

When the printing machines are not fitted with a blanket washer, a stock of cloth greatly in excess of the demands of the orders must be kept, in order to furnish a back grey for each piece of cloth printed and the cloth must be bought with due regard to the width of the goods to be printed; for if the grey is too narrow it is obviously useless, and if too wide it gets soiled with the color on its edges which not only wastes the color but messes up the machinery and increases the difficulty of turning out good clean work. Then again, the extra time and labor that it takes to handle back greys adds materially to the cost of printing and takes up a lot of room. As a matter of fact the "back grey" problem is a constant source of trouble to the printworks manager, and it is not at all surprising that every effort is being made to work without them—hence the use of the waterproof blanket (rubber or otherwise) and the blanket washer.

Back greys are often sewed together on a fine sewing machine but they really ought to be pasted together to avoid any possible ridges caused by the seam.

(This is the second of a series of articles on this subject by Mr. Nanson. The next article will appear in an early issue.—The Editor.)

Factors in Efficient Weaving

Some Notes on a British Experience.

BY W. HAMILTON GORDON

Efficiency of production in the cotton weaving industry rests chiefly on the working capacity of the operative but there are also other factors which have to be taken into consideration. Some of these are personal to the operative, some depend on environment, whilst others are purely physical. The personal factors may be considered to be ability, incentives to work, incitement and practice (incitement can be explained as the freshness with which the operative resumes his task after a break) experience, fatigue and its absence. All these bear on the working capacity of the operative. The environmental factors are ventilation, lighting, temperature and humidity. Ventilation and lighting have an influence on working capacity alone; humidity and temperature have some bearing on working capacity, whilst they have also a direct mechanical influence on efficiency of production. Four factors which have an influence on efficiency of production alone and none whatever on the operative, are the quality of the yarn used, its uniformity, its sizing and the speed of the loom, but, naturally, the working capacity of the weaver has the main influence on efficiency of production.

As the cotton industry is such an important integral part of Britain's industrial life, it is but natural that it should be singled out for particular attention at the hands of investigators. As, also, the weaving section is the one in which the human factor plays a relatively more important part than it does in spinning, an investigation into the factors that make for weaving efficiency is likely to be most useful.

For close on four years the British Industrial Fatigue Research Board has been conducting an investigation in Lancashire weaving sheds on the lines indicated. This has been in the hands of S. Wyatt, M. Sc., who has, of course, had under his direction a staff to make the large number of individual records necessary. The results of this investigation have recently been published and there is much information contained in them which should prove interesting to the industry in the United States, though industrial conditions in the two countries may not be quite on parallel lines.

The *modus operandi* was first to consult a large number of weaving firms in Lancashire to find out which weaving sheds offered the best field for the operations. Eventually it was decided to take observations in ten sheds, some humid and some dry with ordinary looms, whilst others were humid and contained automatic looms. In the humid sheds with the ordinary looms the management agreed that a certain number of looms (261 in all) should be observed for twelve months and that for all this time the same kind of cloths should be produced (five kinds in all). All these looms were worked as constantly as possible in the five sheds in question. Two humid sheds containing automatic looms were placed under investigation, the number of looms here being 344, and one dry shed where 240 automatic looms were working, the conditions of operation being the same as in the former case. All the operatives worked a one-break day, and 48 hours a week, the hours being from 7:45 a. m. to 12:15 p. m. and from 1:15 to 5:30 p. m., and the hours on Saturday being from 7:45 a. m. to noon. The basis of payment right through was by piece-rate and right throughout the investigation, also, the operatives worked at the normal rate representative of their usual output.

Very extensive data were collected, over 1,000,000 individual readings being taken. The result of such a wide scope was that individual variations were eradicated, general tendencies only being obtained on which could be based general conclusions which appear to possess considerable practical value. There is not sufficient space at my disposal to allow me to deal with the statistics and data collected but I will summarize the conclusions arrived at therefrom and indicate the practical suggestions which have been made from the results obtained.

First, then, let us deal with some general deductions before proceeding to examine individually the efficiency factors.

Efficiency appears to be lowest at the commencement of the working day, rising as noon approaches and becoming yet higher in the afternoon. The weavers take their breakfast at the sheds and have started work without any food being consumed. Just as they are getting into the swing of weaving there is a slight break, during which they consume their breakfast. Possibly, also they are slower in commencing work first thing in the morning than when they resume again after dinner. As regards days of the week, efficiency is low on Monday, rises throughout Tuesday and reaches its highest point on Wednesday morning. On Thursday and Friday efficiency declines and this falling off becomes very marked on Friday afternoon. On

Saturday morning efficiency is from 7 to 18 per cent below the average for the week in some cases where the looms are cleaned by the operatives. In those sheds where the cleaning is done by personnel specially engaged for the work, however, the efficiency remains average. The low Monday efficiency is chiefly attributed to the loss of swing caused by the week-end break coupled with the unfavorable atmospheric conditions which prevail in some of the sheds first thing in the morning; often, in the winter, suitable conditions of temperature may not be reached until work has been in progress for three hours or so. The decreasing efficiency as the week advances is attributable to the cumulative effects of fatigue on the operatives.

Now to consider the individual factors which govern efficiency, taking first those connected with environment. It is an axiom of the British cotton industry that a high temperature is necessary where cloth is being woven. Therefore the average temperature for the year may range from 70 to 75 degrees in many cases and during the summer weather it frequently gets as high as 90 degrees. The investigator found that in the humid sheds a rise or fall in temperature is usually followed by a rise or fall in output, which is directly due to a decrease or increase in the number of yarn breakages occurring. The case was different with the dry shed. Here the figures showed that as the temperature rose there was a slight decrease in output, but he is careful to point out that there is considerable difference between the yarn used in humid sheds and that woven where the temperature is dry.

As the humidity increases in a humid shed the output is also supposed to increase. It is therefore the practice to keep the humidity at a very high level, which varies from 60 to 90 per cent. From the records obtained it would appear that this theory is correct, for the number of yarn breakages increases as the relative humidity decreases and a high temperature, unless accompanied by a high relative humidity, is not conducive to weaving efficiency. The question of ventilation is an all-important one because it is only by a really efficient system with very strong air currents that the injurious physiological effects of high temperatures and excessive humidity can be combatted. Some very interesting results bearing on lighting were obtained.

For weaving, a strong light, which must be uniform, is a necessity. Natural lighting from the sheds is usually obtained from the roof, north light being preferred. In some sheds the roof light is supplemented by lateral windows. The natural light is found to vary greatly in intensity at the various looms, in some cases the light at the latter being less than one per cent of the natural light outside. It is thus apparent that during the winter months there will be a great variation in the quantity of artificial light used in different sheds. There is a direct relation between the amount of artificial light used and the ratio of roof lights to floor area in every single shed. The reflective power of the walls and roof of the shed is another factor which has to be included. It is evident from the records made that the output increases as the proportion of work done by artificial light decreases and that artificial light is inferior to natural for processes such as weaving. The quantity and quality of the work both suffer, and there is, of course, the additional expense to be considered when the operations are conducted by artificial light, whilst it is possible also that the conditions mentioned are inclined to help the onset of fatigue amongst the operatives.

In this connection, some investigations were made by photometer in some of the sheds and these showed that in the shed where the average illumination on the warp was lowest the output was also lowest and also that more sources of lower candle power are more effective in contributing to efficiency than are fewer of higher candle power. Glare and shadows were also studied. As regards the first the weaver is exposed to artificial light which strikes the eye obliquely, distracting and disturbing her. The remedy for this is that every light source should be shaded from each worker so that no part of the filament is distinguishable through the shade. A deep reflector not only eliminates glare but also concentrates the light upon the warp. Shadows are often cast in places where they are undesirable when a light is placed in an unsuitable position, which decreases the practical efficiency of the light and, where a shadow is thrown by a moving object such as belting, the flickering of this is particularly annoying to the operative. Of course, these flickering shadows are not caused where the looms are worked by individual electric drive. The only remedy appears to be carefully considered placing of the light sources.

Taking ability as the first of the personal factors in efficiency, it is natural that differences should be well-marked. Some weavers are able to control as many as five or six looms turning out the same class of cloth, whilst others will not be able to attend to more than two satisfactorily. The figures collected showed that the weavers' efficiency varied from 70.2 to 92.6 per cent, a difference of 22.4, the average deviation from the mean of all the weavers under observation being 4.5 per cent. Leaving out of account differences in the yarn or the loom mechanism, which are always present, because no weaver gets the same output from each of her looms, the large variations in production are due to differences in natural ability and in the actual methods the operative employs. These variations are remediable; to get the highest ability careful vocational selection must be employed, whilst improved methods would result from a more exact system of training.

About experience there is little to be said. The weaver obtains it in the course of her work. But some interesting generalizations can be made concerning incitement and practice. When the worker ceases operations for a long or short interval she becomes "cold" and has to be "warmed up" again before she reaches the stage of maximum efficiency. She requires mental and muscular co-ordination. Her efficiency increases steadily for the first three hours and slackens off again as the midday break approaches. When she resumes work she commences at a low efficiency which steadily rises to the maximum for the day, afterwards slackening away as the hour for ceasing work approaches. This production curve is due to incitement, practice and fatigue. With loss of swing, or incitement, she commences the day but her muscular co-ordination and activity increase and production remains at a high level until fatigue supervenes. Sometimes there may be a final spurt just before work ceases, due to appreciation of the fact that work will soon finish. When work is resumed after the dinner hour the temperature and humidity conditions in the sheds

(*Continued on page* 743.)

What the Southern Mills are Doing

Interest of southern textile financial executives is being directed toward the annual convention of the American Cotton Manufacturers' Association, to be held at the Hotel Traymore, Atlantic City, N. J., on Tuesday and Wednesday, May 27th and 28th. The traditional banquet of the Association will be held on Tuesday night, it is announced by Mr. Adams, secretary-treasurer, and it is urged that those who have not already made reservations do so promptly. The convention sessions will be held on Tuesday and Wednesday, and much of interest and importance to southern mills will be forthcoming in the several addresses and other features planned.

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Operating executives—the superintendents and overseers—are looking forward to the annual convention of the Southern Textile Association at The Mayview Park Hotel, Blowing Rock, N. C., on Friday and Saturday, June 13th and 14th. The election of officers and other features of importance will occur at this meeting. Vice-President Marshall Dilling has some excellent plans for the program, and the occasion is expected to be a pleasurable and profitable one for those who attend. It is planned to have two Pullman cars of mill men and sales representatives from the Georgia and Alabama section, to leave Atlanta on Wednesday night, June 11th and to be met at Gastonia by Carolina men in automobiles who will transport the delegates to Blowing Rock.

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At the first meeting of the board of governors of the recently revivified Southern Yarn Spinners' Association, C. Singleton Green was appointed as full-time secretary, and will maintan offices in Charlotte, it is announced. Mr. Green has been secretary of the Cotton Duck Association in New York, and has had considerable experience in manufacturing and association activities. Another feature of the board meeting was the selection of Stuart W. Cramer, R. G. Rankin, and A. J. Draper as members of the board. These men were placed on the board in addition to the members announced in these columns last month.

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Important among the construction items of the past month was the announcement that William A. Mitchell and associates will erect a mill in Houston, Texas. This will be Houston's first textile plant, and, it is stated, the first mill in the South to produce cotton blankets. The first unit will cost approximately $500,000. This initial unit will be 133 x 400 feet, and will have in its equipment approximately 225 broad looms. A village will be constructed in connection with the mill. J. E. Sirrine & Company, of Greenville, are the engineers. The Houston Chamber of Commerce sponsored the project, it is announced.

Mr. Mitchell, the new manager of the mill, is well known. For twelve years he was agent of the Massachusetts Mills at Lowell, Mass., resigning that position some months ago.

Another Texas item of interest is the statement that the El Paso Cotton Mills, at El Paso, has let contract for the erection of a two-story mill building, 104 x 400 feet, of concrete construction, and a weave shed, 104 x 100 feet, and a dyehouse, 78 x 100 feet. The initial equipment will include 5,016 spindles, later to be increased to 12,000. A. P. Coles is president.

The Waco Twine Mills, Waco, Texas, have installed a No. 10 Finnell system of electric scrubbing, furnished by the American Scrubbing Equipment Sales Company, Hannibal, Missouri.

Georgia had some items of interest. The Ensign Cotton Mills have recently erected a 50 x 100 foot warehouse and a 20 x 40 foot press room.

The Palmetto (Ga.) Cotton Mills have installed 12 new 42-inch Draper looms.

The Aldora Mills, Barnesville, Ga., recently completed twelve cottages for operatives and are constructing a like number at this time. A new warehouse is also being added to the mill's facilities.

Mandeville Mills, Carrollton, Ga., have started the operation of a new reinforced concrete construction dyeing and finishing plant. This has three yarn dyeing machines, with a daily capacity of 2,500 pounds, a two-section dryer, an extractor, etc.

Bremen Looms, Inc., will be the name of the plant to be started at Bremen, Ga., by the Mandeville Mills of Carrollton, Ga. The Bremen plant will have an initial equipmentt of 65 looms and will produce novelty weaves. J. A. Mandeville is general manager, with R. A. Whatley as superintendent.

The new installation work at the Manchester Mfg. Co., Macon, Ga., now includes a 200-hp. motor which is being put in place, in addition to the 18 new Universal Winders recently added.

Liberty Cotton Mills, Dallas, Ga., are to erect and equip a dyehouse and finishing plant.

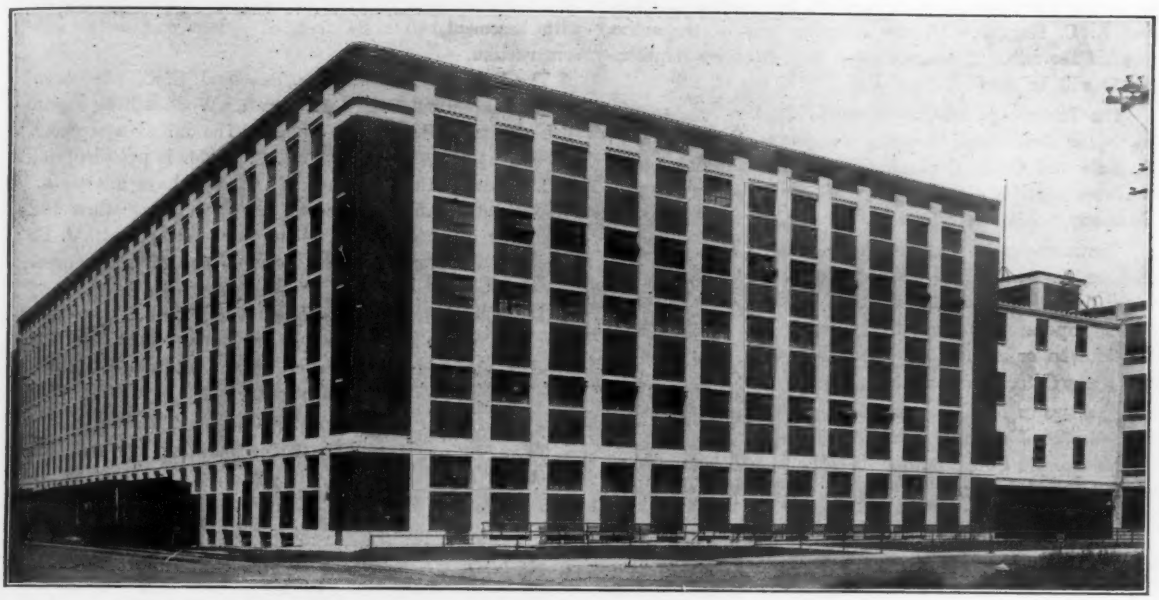
The new addition at the Tallassee Mills, Tallassee, Ala., will be a four-story, reinforced concrete structure, 367 x 144 feet, with a one-story opener room 80 x 100 feet, and a one-story warehouse. The building contract has been awarded to Potter & Shackleford, of Greenville. Contract for building approximately 150 tenement houses has been awarded to Daniel Lumber Company, of LaGrange, Ga. J. E. Sirrine & Company are the engineers in charge.

E. S. Draper, landscape architect and engineer, 101 Marietta St., Atlanta, Ga., has been retained by the Shawmut and Lanett Mills of the West Point (Ga.) Manufacturing Company to plan street improvements in the villages, consisting of street grading, concrete curbing, etc.

The Maginnis Cotton Mills, New Orleans, La., are nearing the completion of a very extensive program of installation, converting one of their mills to the manufacture of chambrays and denims. This will not interfere with their production of cement bags and osnaburgs.

The Interstate Textile Manufacturing Co., Inc., 618 Phelan Bldg., San Francisco, Cal., intend to build mills for the manufacture of wide sheetings, shirtings and ginghams, gray, bleached, dyed and mercerized cotton of all counts, grades and kinds for all purposes, according to an announcement.

North Carolina had three mill sales of interest last month. The Bearskin Cotton Mills, Monroe, N. C., were purchased by W. H. Belk and others of Charlotte, for $122,350. Associated with Mr. Belk in the ownership will



Mishawaka Woolen Mills, Mishawaka, Ind. Albert Kahn, Detroit, Architect.
Truscon Steel Windows and Truscon Reinforcing Steel used throughout.

Windows Are The Eyes of this Textile Plant

The very nature of the textile business calls for unlimited light and ventilation in the factory or mill. Natural daylight is one of the most important factors because it is conducive to a better quality of work. The value of clean, fresh air in place of a dusty, stuffy interior is beyond question.

In the Mishawaka Woolen Mills, Mishawaka, Ind., provision for a full degree of natural daylight and ventilation was made when the building was designed. Truscon Steel Windows made this a daylight building with light streaming in from all angles. Any number or all of these windows may be opened, depending on weather conditions.

The window arrangement shown here is only one of hundreds of arrangements that may be secured when using Truscon Steel Windows. Truscon windows may be opened or closed by mechanical operators, or operated individually as desired. They will not sag, warp or get out of order and are easily operated. They serve as a protection against fire, storms and decay and add to the general appearance of the building.

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TRUSCON STEEL WINDOWS

be C. W. and Horace Johnston, J. M. Belk, John C. Sikes, and N. C. English. Horace Johnston will be the active head of the mill. It is understood that extensive improvements will be made.

The Tuckaseege Mill, at Mount Holly, has been acquired by the Tuckaseege Spinning Company—A. Q. Kale, F. S. Kale and C. A. Cochran, incorporators—which places the ownership of the property with the Southern Power Company, it is understood.

Contract was let last month by Steele's Mill, at Rockingham, N. C., to T. C. Thompson & Bros., Charlotte, covering the erection of four standard sections of warehouses and an opener room, new slasher room and supply building and boiler plant. Robert & Company, Inc., Atlanta, are the architects and engineers.

The Brown Mfg. Company, Concord, N. C., is installing additional cloth finishing machinery.

Mooresville Cotton Mills, Mooresville, N. C., have purchased 540 Crompton & Knowles Looms, and have placed contract with the Allis-Chalmers Mfg. Co., for 1,156 individual drive motors. They have also purchased a Moore bleeder type turbine.

Construction work has started on the addition to the High Shoals (N. C.) plant of the Manville-Jenckes Company. A total of 50,000 spindles will be ultimately installed. Contract has been let for 160 new cottages in the mill village.

The Thrift Manufacturing Co., Paw Creek, N. C., has been purchased by Harry B. Kendall, of Boston, who also operates the Wateree Mill, at Camden, S. C., and the Addison Mills, at Edgefield, S. C.

Two short courses in textiles will be offered at the Textile School of the North Carolina State College, Raleigh, N. C., it is announced by Thomas Nelson, director of the school. One of these courses is planned for young men working in the mills, and will cover weaving, designing and textile calculations. Another course offered will be for teachers in schools located in mill communities. This course will be a general summary of textile work so that these teachers may become familiar with the various machines in the mill and their operation, and help in their work of teaching the children in mill communities. Further information may be secured from Professor Nelson.

South Carolina also reported a mill sale involving an important property. The Banna Manufacturing Company, at Goldville, S. C., was acquired by the Oswego Shade Cloth Co., of Oswego, N. Y. Under the new ownership, it is understood, the plant will be under the management of Lockwood, Greene & Co., through the Spartanburg office, and will manufacture cloth for window shade purposes. It is understood that the Oswego company will increase the capacity of the plant, adding 20,000 spindles and 400 looms.

The Seneca (S. C.) Plant of the Lonsdale Company has awarded contract for the construction of 85 additional houses and a boarding house in the mill village. It is understood that a large number of spindles will be added, much of the machinery to be moved from New England plants.

A brick school house containing 18 rooms soon will be erected by the Dunean Mills, Greenville, S. C. Plans are being prepared by J. E. Sirrine & Company.

A community building will be erected by the Spartan Mills Spartanburg, S. C. The building will be two stories with basement, 45 x 84 feet, of stucco and metal lath construction.

The Pageland Cotton Mills, Pageland, S. C., have been organized, and machinery purchased. Work will be begun soon on the building and village. The initial equipment will consist of 6,000 spindles. J. C. Taylor is president.

The Alma Mills, Gaffney, S. C., will have a total of approximately 25,000 spindles and 500 looms when the machinery installation now under way is completed. J. E. Sirrine & Company were engineers in charge of the erection of the new building.

The Elk Cotton Mills, Fayetteville, Tenn., have just completed seven new bungalows for operatives. This mill recently enlarged its facilities by the addition of 4,000 spindles and auxiliary equipment.

The North Carolina Finishing Company, Yadkin, N. C., is to erect another section to the building, contract for which has been let to L. S. Bardshaw, of Salisbury, N. C. The addition will be 50 x 143 feet, of steel construction, with brick foundation.

It is announced that the Erwin Cotton Mills will move their denim looms and dyeing and finishing equipment from their West Durham plants to Duke, N. C., and that Erwin Mill No. 1 at West Durham will be converted into a wide sheeting mill. They have purchased three Cocker one-run indigo dyeing machine units, each of which will handle 24 warps at one time.

A. K. Adams & Company, contractors, Atlanta, Ga., have been awarded the building contract for the erection of the mill buildings for the American Thread Company, at Dalton, Ga.

The Union-Buffalo Mills Co., Buffalo, S. C., will construct a new school building, to be of brick and hollow tile, two stories and basement, and to contain ten class rooms and a principal's office.

The New England Mill Situation.

Depression in the cotton industry in New England is bringing about unusual reactions, some of which are not uncommon in the experience of manufacturers. The efforts to restore longer working hours in Massachusetts through a modification of the legislative restructions have failed. Outside of a few manufacturing interests no very great public support was given to the movement. Neither stockholders, merchants, nor mill operatives rallied to the support of petitioners who only asked a restoration of conditions such as those prevailing in other New England states.

The prolonged idleness in Fall River and Lawrence was bringing on real distress among many of the mill workers until public attention was called to it a month ago. Since then there has been some improvement in the measure of employment. At Fall River the mills of the American Printing Company, seven in number, were started for a two weeks' run and they will be kept running if trade warrants it. In Lawrence the mills connected with the Pacific mills have been run at intervals and the print works and bleachery have been operated more regularly. It was not known to what extent the idleness had progressed until unusual calls were made on the city poor departments for assistance.

In connection with the resumption of operations by the

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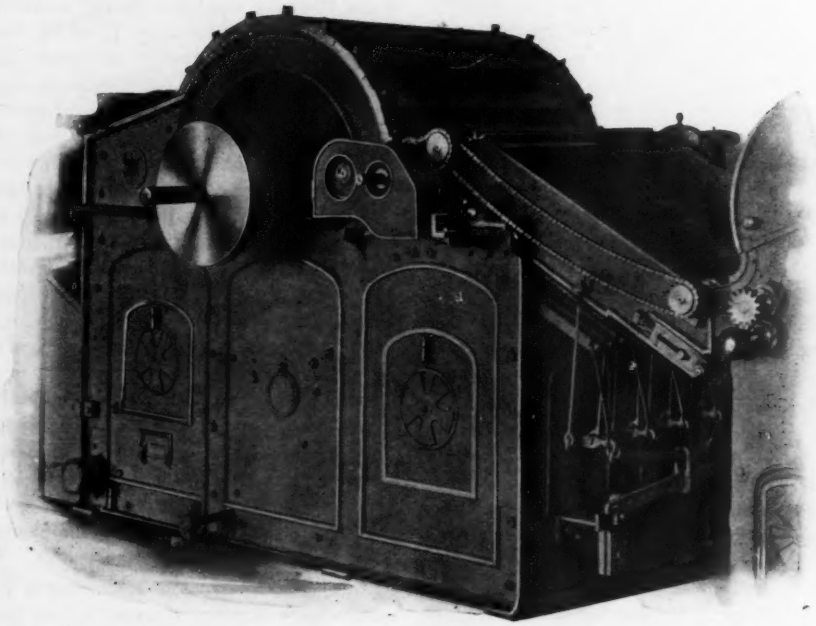

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mills of the American Printing Company it was said that cloths could be bought very much cheaper in the open markets than the mills could make them. But as the machinery had not been turned over from December 13 of last year, it was believed that it would be a good time to resume for a while. When the mills were ready to start over 5,000 people applied for work. Of this number only 3,000 could be given places. Some of the employees had left the city but on reading of the reopening of the mills many of them telegraphed in to have their machines held for them.

Of the 15,000,000 or more spindles in New England more than 5,000,000 have either been stopped or have been run on short time all this month. Some mills are entirely closed and have remained so for two months. A number of the mills of the Consolidated Textile Corp., in Rhode Island, and a number of the other groups, are now idle or still running short time. The Berkeley mills of the Lonsdale Company were closed owing to a lack of business, for the first time in their long history. There have been times when the mills have been closed by strikes or unprofitable business, but it is now said that orders simply have not been available in large enough volume to make operations worth while.

In Manchester, N. H., the Amoskeag Company is operating to 70 per cent of capacity. Some mills in Maine have been running three or four days a week since early in March.

Although most New England mills have curtailed production somewhat ever since last December, manufacturers feel that a great mistake was made by cloth manufacturers as a whole in not having come to some sort of an understanding to shut down concertedly to the end that excessive cotton speculation might be curbed. As matters stand they now feel that it will be well into the next cotton crop year before cotton prices will become at all stable and give manufacturers an opportunity to plan for sales at a profit over any long period.

The hopeful thing in the outlook is that southern manufacturers have now joined into the plans for curtailment. It is hoped that if this new curtailment attains as large proportions as that in New England recently, say about a third of the spindleage for a couple of months, a sure corrective will be applied to the cloth markets and will make a better foundation for a more profitable business from the next cotton crop whatever the final yield may prove to be.

New York selling agents have been advising their clients in New England for three months past that they considered it hopeless to look for a profitable market for cotton goods at 30 cents a pound or over in a single year if mills insisted upon producing all the machinery would turn out on full time. The matter has been taken up at intervals in New York in an effort to induce all cotton manufacturers to curtail and it is stated that action was not taken because of fear that a violation of the Sherman law might be charged.

One of the oldest cotton manufacturers in New England pointed out a couple of months ago that the industry was going through an experience unlike anything hitherto encountered. There have been times in panic and after-panic periods when prices were low and oftentimes under cost. But during the life of this high-proced crop the country has been fairly prosperous and workingmen well employed, yet for weeks at a time prices for cloths have been under the cost of replacement, hence on an unsound trading basis for contract deliveries. Latterly, the condition has developed where the actual margin for manufacturing has been narrower, above the cost of cotton, and for a longer time than any cotton manufacturer has seen. To meet such a situation, he urged that curtailment was the only remedy and if it were not generally adopted he predicted very serious credit condition before the strain would end.

Within a month some attempts were made to bring about a reduction in wages. When the matter was brought to the attention of manufacturers at Fall River and New Bedford, and in some other parts of New England, the suggestion was considered of no value. It was contended that any reduction that could be made at this time would immediately be absorbed by the buyer without benefit to the market. This view was in harmony with the belief of selling agents and the matter of wage revision was dropped.

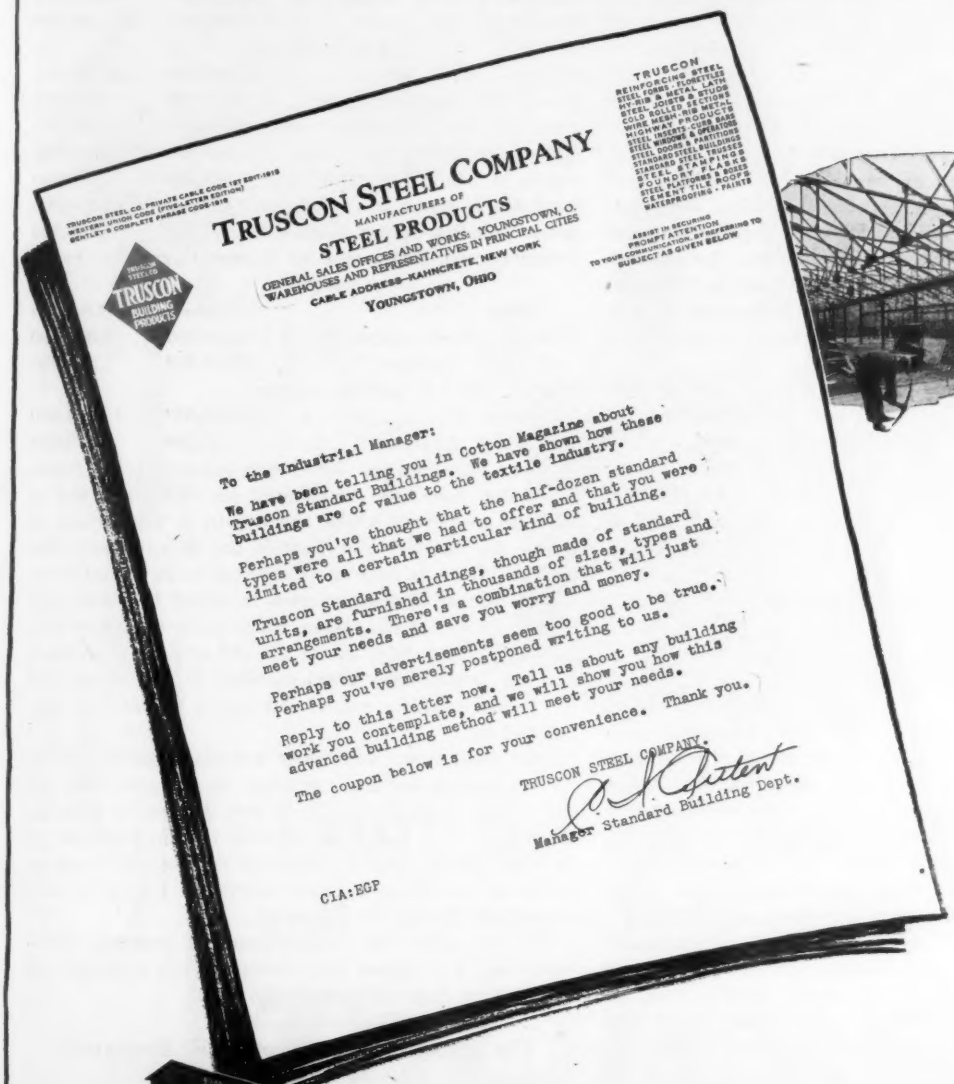
In the past five or six weeks the pressure upon fine sections has increased rapidly since April 1. Forward business has been very light and spot trading was small. The difficulties of these mills have been greatly increased by the unusually large importations of English fine cotton goods. These have included fine poplins or broadcloths, as they are called, very fine sheer sateens for lingerie purposes, and fine sateens for venetians. On a single steamer entering New York this month fully 50 different consignees in the converting and dry goods trade received goods of this sort. The figures of imports show that this country has been getting from three to four times the yardage that came in before the war, even under the low Underwood tariff. Naturally, the domestic mills have found their markets contracted.

Goods have not been accumulating in New England mills. Some large gingham mills have barely a thousand cases of unsold goods in warehouse. Fall River mills have run so lightly that when special constructions in narrow widths are wanted buyers must order ahead or go without. About the second week in April Fall River mills sold 170,000 pieces in one week, more than half of which had to go on the books for contract delivery although many of the cloths were more or less staple.

Some of the New England mills have been doing more business for export in the past two weeks than at any time in over a year. The American Printing Company has made large sales of narrow prints, percales, and dyed goods for export. The Pepperrel mills of Biddleford, Me., have sold over 3,000 bales of standard drills for shipment to India, taking up the possible product into June. One mill has made a substantial sale of cotton flannels for shipment to China, the first of these goods ordered in more than a year. One of the large hosiery plants has been selling fiber and staple cotton hosiery very freely for export. One of the gingham mills has sold freely for export to Cuba and the Philippines.

Artificial silk is entering in a very large way into New England products. In the past six months all the large manufacturers of bedspreads have been using this material mixed with cotton to supply the demand for novelties in colors and weaves. Some of the goods are highly decorative in jacquard figures in silk through upon the cotton

An Open Letter to Manufacturers
Will You Answer it?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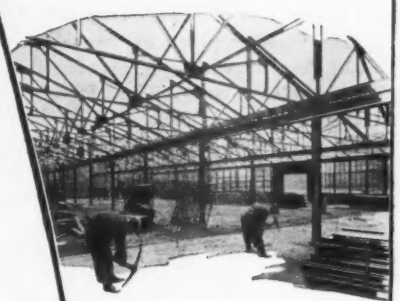

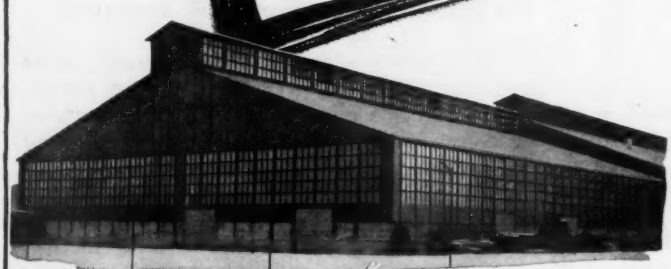

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foundations. Others are woven in stripes. Some mills are making fabrics of cotton and artificial silk for upholsteries and they are having a ready sale. The use of the material in print cloth yarn and finer yarn numbers has been extending constantly. Some mills are having good success in mixing the material for shirtings, while others find that the cloths do not finish well enough to satisfy them.

It is the current opinion in New England that trade will not be much better till after the June political conventions have been held and Congress has adjourned. They have little hope that prices will improve quickly with the demand unless mills bring about a condition where goods are scarcer than they have been recently.

The finishing plants of New England have been hard hit by the dullness of the past several months. Job printing orders have been especially small. The bleaching and dyeing have been better than other divisions. Large quantities of English goods have been processed in this country. One of the difficulties with many finishers has been in getting sizable runs on goods. Small runs are offered frequently but they are not profitable.

Machinery plants are inactive as a rule. Some are running three or four days a week with limited workers employed. It is stated that considerable research work is underway in some of the machine shop laboratories looking toward the devising of new processes and new machines but little of the information about this strengthening development is allowed to become widely public.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, April 16th, 1924.

Market developments during the past month were somewhat more favorable as to the situation in domestic textiles. On the other hand, some improvement has taken place in prospects for the next crop, consequently old crop deliveries are somewhat higher than last month, while new crop options are somewhat lower than one month ago.

In addition to the slight improvement noted in the domestic cotton goods situation, there has continued a good demand for raw cotton for export, with prospects for the continuance of free shipments to Europe in the future. Compared with last season, exports from the United States since August 1st total 4,691,000 bales vs. 4,012,000, or 48,000 bales larger already this season than they were for the whole of last season. As a result of the heavy drafts by Europe on the remnant of the old crop, stocks in the interior are very light, consequently it is becoming increasingly difficult to buy cotton in quantity, especially desirable grades, and this situation is likely to become more acute as the season draws to a close.

A sustaining feature of the market has been the continuance of favorable trade advices from Manchester where a good business is being put through for India and China, with spinners all working on better margin than for several years, while the Liverpool stock is being drawn against for shipment to the Continent, principally to Germany and Russia.

The economic situation abroad has improved materially of late, as noted by the important advance in foreign exchange, notably in the remarkable recovery of the franc and the sharp advance in sterling, due probably to the encouraging manner by which the Dawes reparations plan was received and considered by the Allies and Germany, giving hope for an early settlement of the reparations problem.

BRITISH BOARD OF TRADE REPORT FOR MARCH.

	This Year	Last Year
Exports of yarn, pounds	13,000,000	13,039,000
Exports of cloth, yards	354,000,000	337,000,000

CENSUS REPORT.

Bales—United States	This Season	Last Season
March con., including linters....	525,000	679,000
Con., 8 months, including linters.	4,446,000	4,908,000
Mill stocks, March 31	1,498,000	2,034,000
Stocks in public Stg., Mar. 31..	1,984,000	2,380,000
Total stock, March 31	3,482,000	4,414,000
Active spindles during March...	32,392,000	35,498,000

INTERNATIONAL FEDERATION OF MASTER COTTON SPINNERS REPORT.

Bales	This Season	Last Season
World's spinners stocks, Feb. 1..	4,088,000	4,851,000
of which American	2,360,000	2,804,000
World's con., 6 months, ending January 31	10,434,000	11,384,000
of which American	5,732,000	6,762,000

For a long time past Manchester spinners, using American cotton, have been curtailing 50 per cent, which was to continue another six weeks, but recently it was decided to extend the half time movement to the close of next September. There is only one conclusion to be drawn from the decision of English spinners to extend half time, not only to the end of this season, which comes to a close with the end of next July, but to the end of next September, and that is that there would probably be not enough cotton to last until the end of this season if full time was resorted to.

The small stocks everywhere and the decision of British spinners to continue curtailing 50 per cent until the end of next September, or until new crop cotton is available in quantity, shows the necessity for the South to try to raise a large crop this year for next season's requirements, as indications are that reserves by the end of this season will be all but exhausted.

As yet new crop preparations are generally backward, but it is hoped that conditions will improve and that a large crop will be made in 1924.

The Material That Meets Mill Economy.

This is a highly specialized age. And because it is the era of the technical expert, materials and processes are subject to a scrutiny unknown a comparatively few years back.

Certainly industry has profited by this new scheme of things. And, as in the case of the textile industry, this selection of materials has a broad bearing on economical production. Through qualities of superior efficiency and durability ultimate costs are lowered all along the line. The advantage goes to the consumer and to the upbuilding of the industry itself.

Such a beneficient material is vulcanized fiber. It meets all the tests required of a mill material, including the highly desirable one of ultimate economy. It follows, therefore, that vulcanized fiber has been utilized in a great variety of mill accessories, including its use in the manufacture of warper and twister spools.

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Notes About Men You Know.

George H. Lanier, vice-president and general manager of the West Point Manufacturing Company, of West Point, Ga., has been made president of The Dixie Cotton Mills, at LaGrange, Ga., succeeding the late Robert C. Freeman.

George A. Franklin, who for the past several years has been superintendent of The Sibley Manufacturing Company, Augusta, has been made general manager of this plant and the Enterprise Manufacturing Company and the Augusta Factory, the three Augusta mills of which Jacob Phinizy has been the head. Mr. Phinizy having retired as president of the Augusta Factory and The Sibley Manufacturing Company, Samuel A. Fortson, who has been president of the Enterprise Manufacturing Company, has been appointed to that position at the two other mills.

Frank E. Howard, who will be divisional superintendent of the finishing department of the Pacific Mills, now being constructed, at Lyman, S. C., has arrived. Mr. Howard has been connected with the Pacific Mills at Lawrence.

W. F. Smith, formerly superintendent of the Bibb Mfg. Co. plant at Reynolds, Ga., has become night superintendent at the Perkins Hosiery Mills, Columbus, Ga.

B. H. Heath, formerly treasurer of the Manetta Mills, Lando, S. C., died in Charlotte on March 13th. He had been in ill health for several years.

B. Y. Adams, formerly overseer of weaving at the Fulton Bag & Cotton Mills, Atlanta, has accepted a similar position with the Ware Shoals Mfg. Company, succeeding W. W. Greer, resigned.

Thomas C. Adams, who has been superintendent of the Ohio Cotton Mills, Columbus, Ohio, has resigned and become superintendent of the Manville-Jenckes Company, High Shoals Division, High Shoals, N. C.

Thomas J. Lynch has resigned as overseer of spinning and winding at the Fuld & Hatch Knitting Co., Cohoes, N. Y., and become overseer of spinning, twisting and winding at the Mohawk Carpet Company, Amsterdam, N. Y.

E. E. Lovern has become superintendent of the Liberty Cotton Mills, at Dallas, Georgia.

Charles Boyd, of Lumberton, N. C., has been made superintendent of the Wymojo and Helen Mills, Rock Hill, S. C., succeeding F. D. Frissell, resigned.

Herbert Midgley, president and general manager of Howard Bros. Manufacturing Company, Worcester, Mass., accompanied by the southern agent, E. M. Terryberry, sailed from New York on April 5th for a two months' trip to European textile centers.

S. P. Cole has become overseer of spinning at the Flint River Cotton Mills, Albany, Ga.

C. E. Willis was recently appointed overseer of carding and spinning at the Lullwater Manufacturing Company plant, Thomson, Ga.

B. R. Dickson has been promoted from assistant superintendent to superintendent of the Greenwood Cotton Mills, Greenwood, S. C., succeeding J. B. Harris, who has assumed the duties of vice-president, to which position he was selected some months ago.

Paul Jennings, of Providence, R. I., has become assistant superintendent of the Aiken Mills, Bath, S. C., and the Seminole Mills, Clearwater, S. C.

G. A. Hamrick has been made overseer of carding at the Lyman Division of the Pacific Mills at Lyman, S. C. He was formerly at Columbia.

A. O. Lafoy has become overseer of spinning at the Walton Cotton Mills, Monroe, Ga., succeeding J. P. Damon.

H. E. Bates has become superintendent at the Deep River Mills, Randleman, N. C., succeeding P. C. Story, resigned. Mr. Bates has been superintendent at the Victor Plant of the Victor-Monaghan Company, Greer, S. C., for a number of years.

Philip C. Story, formerly superintendent of the Deep River Hills, Randleman, N. C., has become superintendent of the Palmer Mill of the Otis Company, Three Rivers, Mass.

C. C. Culbreth has become overseer of carding at the Corley Mills, Cumberland, N. C.

Frank L. Asbury has been promoted to the assistant superintendency of the Hillside Cotton Mills, LaGrange, Ga.

J. T. Swan has become overseer of weaving at the Hillside Cotton Mills, LaGrange, Ga.

S. M. Thrower has been promoted to the position of overseer of spinning at The Dixie Cotton Mills, LaGrange, Ga.

D. C. Floyd has been made overseer of twisting at The Dixie Cotton Mills, LaGrange, Ga.

L. E. Sutton has been made superintendent of the Anniston Cordage Company, Anniston, Ala., succeeding the late Newton Wilson.

S. S. Henson is now superintendent of the Palmetto Mill of the Martel Mills, Inc., Columbia, S. C., under S. A. Dillard, general superintendent.

E. E. Merchant has been made overseer of weaving at the Palmetto Mill of the Martel Mills, Inc., Columbia, S. C., being promoted from second hand.

Alexander Dawkins is now overseer of spinning at the Corley Mills, Cumberland, N. C.

W. M. Miller, formerly overseer of carding and spinning at the Corley Mills, Cumberland, N. C., is now overseer of spinning at the Winnsboro Mills, Winnsboro, S. C.

D. C. Williams has succeeded H. L. Holden as superintendent of the Rockfish Mills, Inc., at Hope Mills, N. C.

Ed F. Woodside, vice-president of the Cotton Manufacturers' Association of South Carolina, was automatically made president by the death of the late James D. Hammett, of Anderson, who was president. Mr. Woodside is vice-president of the Woodside Cotton Mills, Greenville, S. C., and president of the Easley (S. C.) Cotton Mills.

L. F. Kelly has resigned as superintendent of the Elk Cotton Mills, Dalton, Ga., after many years' service, to accept the superintendency of the Poinsett Mills, Greenville, S. C., succeeding A. E. Roddy, resigned.

H. K. Hallett, superintndent of the Wateree Mills, Camden, S. C., has been transferred to a similar position at the Thrift Mfg. Company, Paw Creek, N. C., which is now under the same management as the Wateree mill, being purchased recently by H. P. Kendall, of Boston, and associates.

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Manufacturers of Women's Full Fashioned
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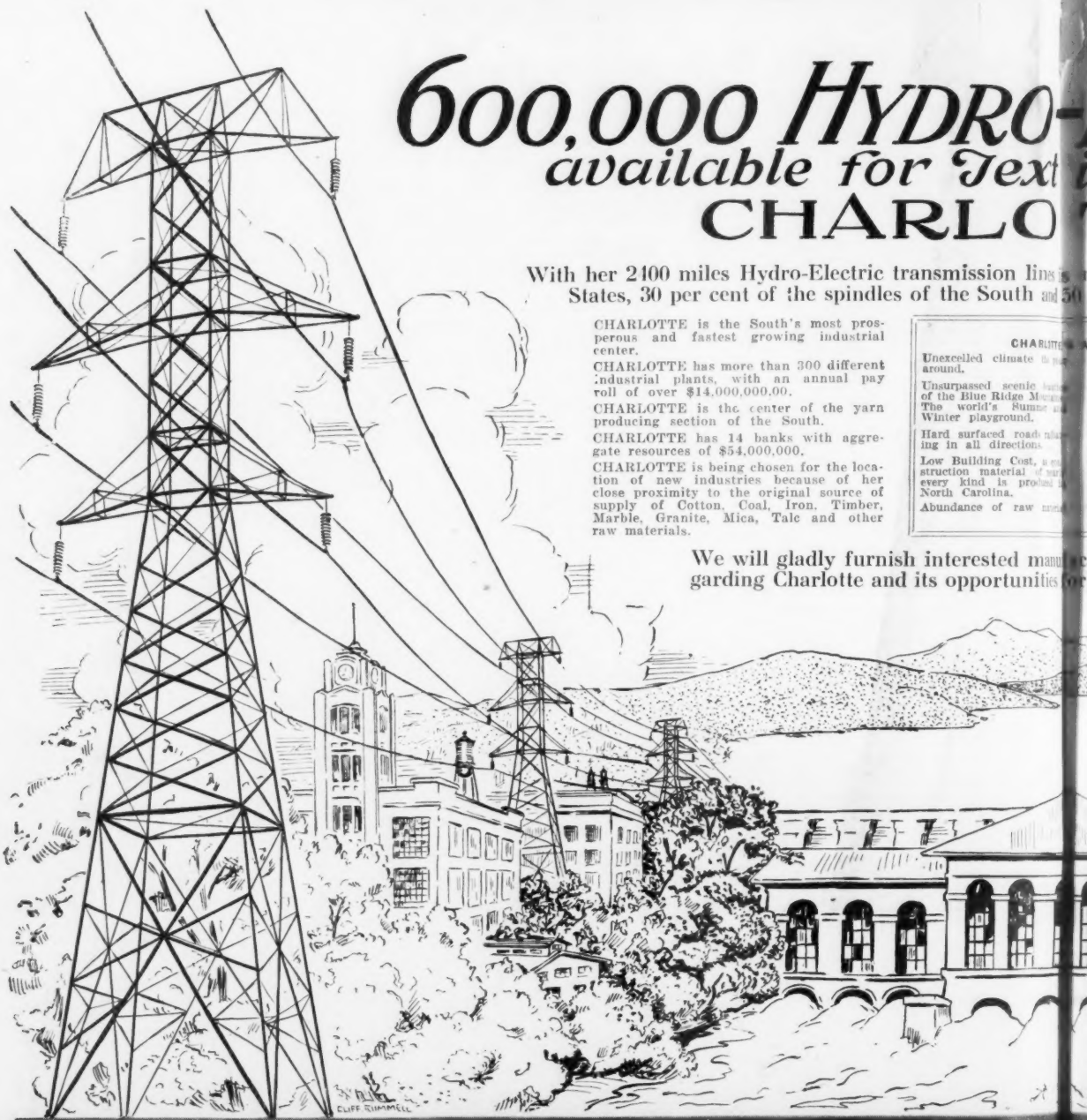

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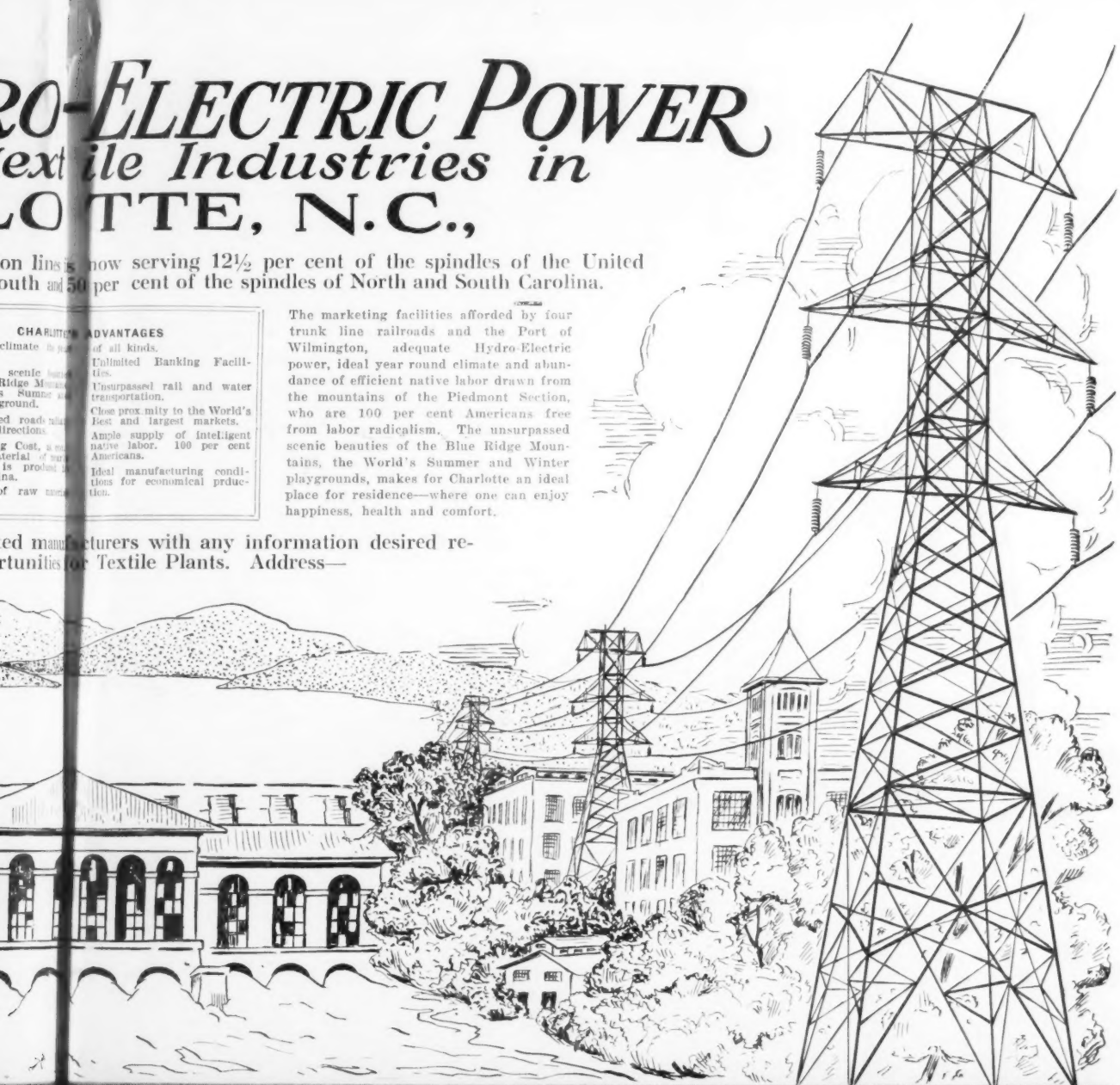

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In the eight large plants, shown above, is every known machine and device for speed and precision in the manufacture of various USB&S Co. products. Every piece of material that goes into the making of these products must pass severe inspection. Every man in these plants is "up-on-his-toes" every minute upholding the reputation of USB&S Co. products.

It takes three of these big plants to keep up with the demand for U S Automatic Bobbins, the bobbins that are stronger, lighter, smooth and true—tested on our customers' spindles before shipping.

Other plants make the S Eye Automatic Shuttle, the best automatic shuttle ever put on a loom, and approved by scores of leading mills—and the Stetson Hand Threading Shuttle, the greatest improvement in recent years—and scores of other products, all of the same superior U S quality.

A sample of any US product will be sent gladly on request. Catalog?

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Eight Factories **Providence R.I.**

AN OLD TIMER SAYS

Few subjects have a more definite bearing on the success, the progress of any mill than "group loyalty." That means that all overseers and the superintendent pull together—where there is a group of men spending most of their time in "passing the buck," then the head of that "group" had better be prospecting for some overseers or you will soon see an announcement in the papers that Mr. So.-and-so has "resigned."

We All Go Up and Down Together.

Just carry that thought around with you a few days and see if you can really understand its true meaning.

Some people criticize because of a mere mania for opposition, some because of jealousy and some are just darn fools.

"The final stage of improvement will never be reached by any mill, machine or person." This applies especially to that smart guy who thinks he knows it all. I'll not call his name, but you know the fellow I refer to.

It's not the amount of money you make that makes you rich, but the amount you save. This does not mean to merely put your savings away for safe-keeping, but make your money work for you by investing in income-bearing property or stocks. The man with money to spare may invest in vacant lots or such stuff and wait for his profit, but the small investor should only invest in income-bearing, safe property until he gets a start.

Don't envy successful men. *Be One.*

There never was an age in the history of the world when it was so true that *Knowledge is Power.* The age when experience alone brings promotion is past, for no one man's experience, by itself, can keep pace with the experience of all the overseers and superintendents in the business. Men must take advantage of what others have learned and are broadcasting free of charge through COTTON.

The college man must get practical experience after leaving college and the practical man can get technical training during his spare time. But if we "Old Timers" don't wake up, that college man will get his practical training faster than we get our technical training.

The time to rest is not during work hours; that is, if you ever expect to get that bigger job.

Plenty of help—work running fine—all machinery on easy numbers or styles—mill selling goods as fast as you can make them—

The devil! Most any boob can run that job.

But—

When all your neighbors are trying to hire every good hand you have—when the president has bought a bunch of sticks, cockleburrs, grass, sand and cotton stalks with a little cotton mixed in to hold it all together—

And then changes you onto the hardest darn style of goods that any mill ever tried to make—

Well, then is when you see the man who knows his business show up.

The overseer or superintendent who "beats the other fellow" doesn't generally have to hunt a job.

The job hunts him.

To do the right thing at the right time, in the right way—to do some things better than they were ever done before—to not make the same error twice—to continue to do the things your boss has told you he wants done—to work for the love of work—to never be satisfied but keep on trying to improve—

Gosh! That would be *some* overseer or superintendent, wouldn't it?

Now read it again. . . Is there really anything set forth in the above motto that is impossible? No, of course not, then why in the— (you finish the sentence).

A lot of fellows think that Opportunity is something that will just happen along some day, pick them up and land them in that big job. They don't seem to realize that they are making their own opportunity by their everyday work. You are making your opportunity by the way you run your present job. By the way you study and prepare yourself for that big job when old Mr. Opportunity brings it along.

If the average overseer or superintendent could only wake up to the fact that running his job is just like putting money in the bank—you can get *out* of it all that you put *in,* with good interest—then we would not have so many jobs looking for good men.

What I mean to say about so many jobs looking for good men is this: It is a painful fact that many of us are holding our jobs, not because we are such blamed good overseers and superintendents, but because our boss doesn't know of a man just at present who is much better than we are. That's why I say that some of us had better wake up, because I hear in many roundabout ways that a lot of these overseers and superintendents are getting their eyes open just a little bit and are "going down after it."

Closing The Books

Use the Date that Suits You Best

Habit is a wonderful saver of mental effort. But too close adherence to habit in business limits efficiency by shutting off initiative.

This is particularly true in the adherence to the habit of following a fixed date for closing the so-called "fiscal" year.

The best date for closing the books and preparing financial statements for the "fiscal" year is when business is in its most liquid condition—when bank loans and other liabilities are lowest, accounts receivable reduced, and, especially, when the inventory is at a minimum.

The most logical date for closing *your* "fiscal" year is that time when *your* business is logically over for the twelve months—when stocks are lowest—when prices are normal—when selling is not being forced—when you are not buying heavily—when profits can be most accurately determined—when your accounting department is not working nights, or your bank is not burdened with December 31st reports. In other words, close *your* books when proper time and attention can be given by your own organization, and when your public accountants can serve you best.

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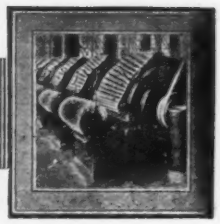


A Question on C O B Machines.

EDITOR COTTON:

I should appreciate it if some of your readers who have had experience with C O B machines would describe their method of blowing or sucking—whichever the case may be—the cotton through the C O B machine, and whether or not it is most practical to place it directly after the bale breaker. P. R. P.

Figuring Some Loom Repair Costs.

EDITOR COTTON:

We have been having some discussion here at the mill on the subject of loom supplies. There are many local conditions which affect the amount of supplies charged to looms at different mills. Possibly a discussion of the subject might be helpful.

For example, some mills use more supplies per loom than other mills do, but they get more production for the dollars they spend in supplies; probably some other mill would have a better record in supplies, but would not have as good a record in production. Some mills, for instance, do not furnish fixers with all the pickers they want to use, therefore, that mill would probably have a lower record on pickers than another mill which would give the fixers all the pickers they needed, in order to keep the looms making more production. All of these things are a matter of judgment or management for the local plant to determine.

The looms I give the following records on are old Draper E Model looms, running on print cloth numbers from 56 x 44 to 80 x 80. This mill changes its style of goods quite frequently, and it usually takes extra supplies when a mill changes styles of goods often. For example, in changing from say 80 x 80 to 56 x 44 goods, it is always advisable to work over all the take-up motions, and take off any worn parts that could cause back-lash in the take-up motion. Sometimes it is necessary to even put in new bearings on the take-up rolls. This, you will of course understand, is done to try to prevent making thin places on the light goods, and as this style of goods is usually used for shade cloth, a thick place is just as much a "second" as a thin place.

The looms I am giving you this report on have also been equipped with new rocker shaft bearings, but I do not remember whether they were all put on during last year or not. At any rate, the shuttles averaged about 1.22 shuttles per loom per year. It cost about 60 cents per loom per year for pickers; but we think this item will be much less this year, because we are having a special picker made of belt stock, and although this picker will cost us considerably more than the pickers we have been using, we feel like the total dollars at the end of the year will be less.

Theoretically, a weave room should only use two pickers for each new shuttle that they use.

Our check strap bill for last year amounted to about .86 pounds per loom per year. I am giving you this in pounds, because you can weigh your check straps and make a comparison by knowing how many straps they run per pound. We realize that this is pretty high check strap record, and we believe we have found a new check strap which will reduce this number of check straps per year by at least 30 per cent. In fact, this record I gave you includes a very poor lot of check straps that the purchasing agent bought during this year.

The item that we designate as loom parts amounts to $3.85 per loom per year. Under the heading of loom parts, is of course included such things as wooden binders, wooden jacks or any other loom parts that were ordered from the loom builder.

I failed to explain that the .86 of a pound of check straps per year also includes all the other leather we used for jack straps, harness straps, covering binders, etc., and for the information of your readers I will say that we buy belting stock, 5 inches wide, to cover our binders, this gives us four straps 1¼ inches wide to cover the binders with. We feel that using this high priced leather for covering the binders is more economical than using slab leather.

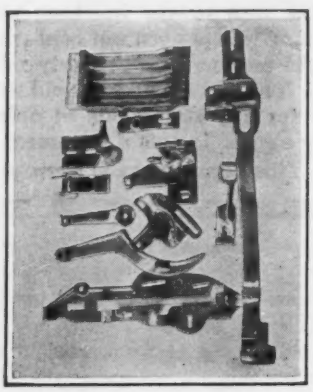
Under the head of loom parts is also included picker sticks; and I will say that we used 7/10 picker stick per loom per year. This does not include the number of picker sticks that we discarded at the supply room. In fact, our percentage of discarded picker sticks runs very high. Sometimes we discard as high as 35 per cent of the number of sticks that we buy.

We do not require the loom fixers to use a stick they can find any defect in. We also pay the picker stick manufacturer a ten per cent premium for making our sticks, and we would be glad to pay them 20 per cent premium if they could give us a still better stick.

The average mill buys picker sticks on price, not real-

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Before you buy and after you purchase



Each of these textile machinery parts was repaired by welding in a few minutes.

Oxweld makes textiles

OXWELD helps make textiles in many mills, for it reduces the idle time of the looms due to breaks of metal parts. Repairing these metal parts by welding results not only in a saving of money, but in a saving of time as well. One mill welded a take-up roll frame in 15 minutes; the brake shoe casting from a cotton loom in 6 minutes; the arm from a whip roll in 5 minutes; the beam fixing stand in 10 minutes; and numerous other parts in equally short periods. Oxy-acetylene welding can do as much in your mill if you will send for an Oxweld Resident Engineer.

OXWELD SERVICE is yours before you buy and after you purchase. Without obligation to you, our nearest Resident Engineer will survey your plant to see if the Oxweld method of welding and cutting offers an economy to you in production or in plant maintenance.

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Oxweld Field Men are at your call to advise you on especially difficult work, to suggest new methods, to inspect your equipment and supervise minor repairs.

Oxweld's engineering department and research laboratories are daily solving the technical problems which aid in the application of the process to new uses and the better doing of old ones.

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izing that a loom fixer who makes, say, 45 cents per hour will consume at least thirty minutes in putting in a picker stick. The labor, then, will cost, say, 22½ cents to install this picker stick, and a new picker, say, will cost 13 cents. Then with the number of wood screws he uses and possibly a new hold-up strap it will cost 35 to 40 cents to install a new picker stick. This does not take into account the loss in production while the loom is standing, and the loom probably stood ten minutes to thirty minutes before the loom fixer started to put in the new stick. Just how a buyer figures out that, when he can save two cents each on buying a poor lot of picker sticks, that he has made money for his firm, I do not quite understand.

There are quite a number of other items in regard to the supplies of looms that might be taken up in detail. I should be glad to see some discussion on this by other readers, and would be glad to furnish any further information that I can. J. H. C. (S. C.)

Asks How to Make "Slough" Filling.

EDITOR COTTON:

I would like to know, through "How Other Men Manage" how to make what is known as "slough" filling—that is, where the twist will run regularly and then once about every four inches a "slough" will be inserted. We have Lowell spinning, 1901 model, coarse design. We run 1.40 hank roving and want to make 7s "slough" filling.

J. J. D. (Ala.)

Information on Making Slub Yarn.

EDITOR COTTON:

The writer is not familiar with "slough" yarn, but offers the following suggestions on "slub" yarn in the hope that it is what "J. J. D." wants, or that it will be of some help to him.

The usual method for single slub yarns is the one shown in Fig. 1. The draft gear D and the back roll gear B are double gears; that is, they are two gears, one large and one smaller, made together. Each gear has gaps in the

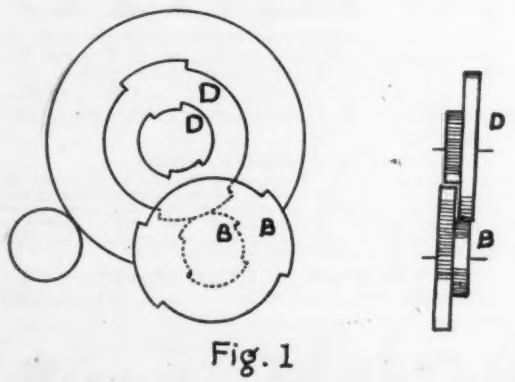


Fig. 1

teeth so that they can mesh, alternately, the small draft gear with the large back roll gear which gives the regular draft for the body of the yarn, and then the large draft gear with the small back roll gear which speeds up the back roll and makes a heavy place in the yarn.

This method is very successful and does not give any trouble after it is arranged properly. There is no accurate method for figuring out for "J. J. D." just what the size of the gears will be or the number of teeth to be taken out of the gaps, as this depends on the size and number of slubs required, etc. He can easily obtain what he wants by a few experiments.

Another common method for this kind of yarn is by the use of eliptical gears for the draft gear and the back roll gear as shown in Fig. 2, but this is not a good arrangement

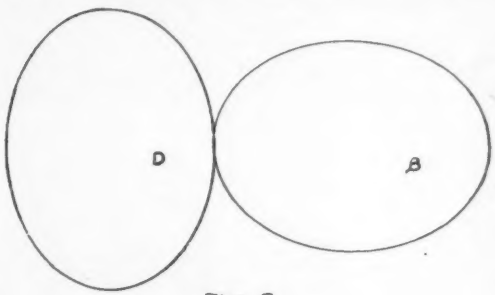


Fig. 2

from a mechanical standpoint and gives a good deal of trouble in operation. It does not give a good slub or bunch in the yarn, but makes an uneven yarn with light and heavy places in it.

Ply slub yarn can easily be made by running the yarn to be twisted through the front rolls, and introducing a strand of roving into the twisting yarn through the second and back rolls. The draft gear in this case is a gap gear with practically all the teeth out except enough to jerk in a little slub of roving at the required intervals.

G. A. F. (Ga.)

Flax Tow as a Cotton Substitute.

EDITOR COTTON:

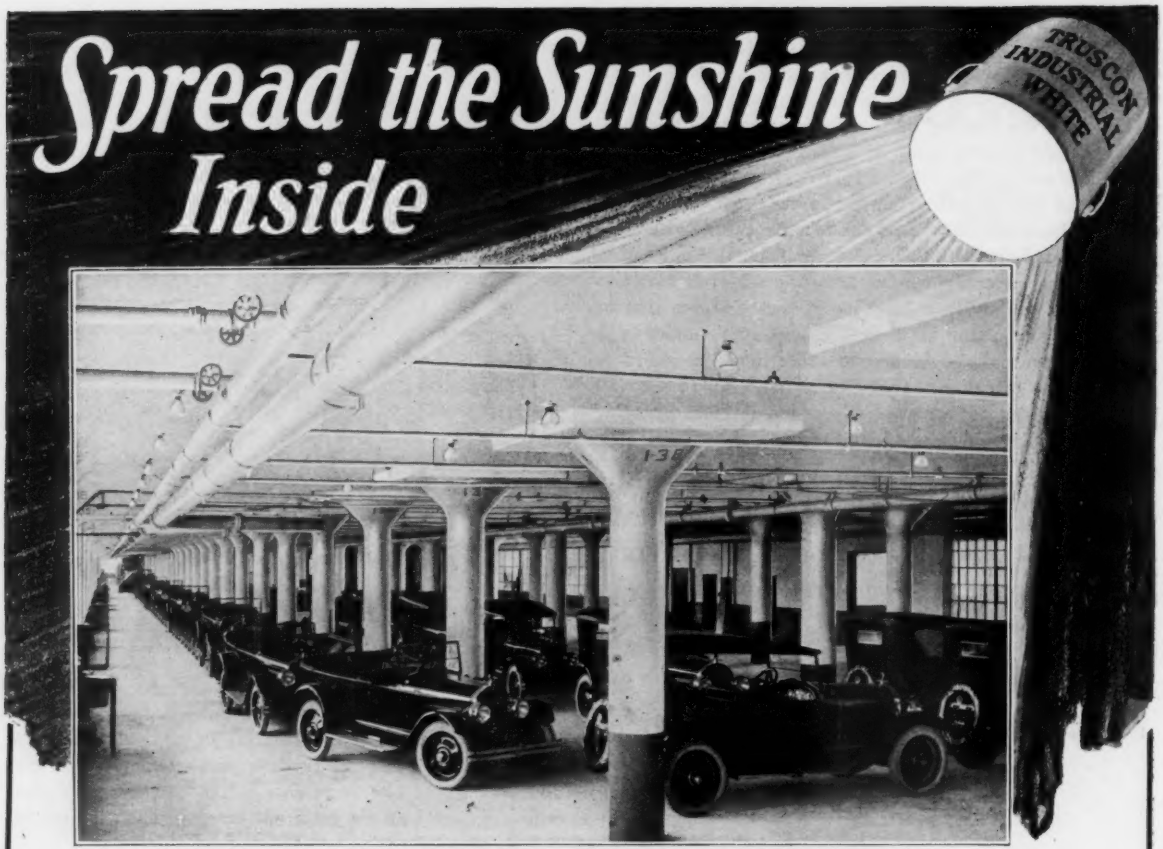
I have seen nothing in your discussion department relative to the use of flax tow, and while this may seem to be a subject extraneous to the general run of material appearing in COTTON, I should like to submit the following discussion thereon with a view to possibly arousing some interest and discussion among your readers who might be doing or contemplating doing this type of work.

Cottonization of flax consists in the splitting up of the flax fibers into simpler fibers of a length similar to cotton. For the best results to be obtained a good quality of flax must be used, the stem-ends being objectionable owing to the amount of woody matter they contain.

Using a mixture of caustic soda and sodium bisulphite as the cottonizing agent, the best results were obtained when working with three small boilers, each provided with a false bottom under which was a steam coil. In each of the boilers are placed 1,000 kilograms of flax-tow, and into the first of them is poured a lye containing 80 kilograms of caustic soda and 15 kilograms of sodium bisulphite 72 degrees Tw. The lid is closed and the steam turned on. When a pressure of three atmospheres is registered, the lye is passed into the second boiler, where it is charged with alkali and bisulphite. From this boiler the liquor passes to the third, where it receives a precisely similar treatment.

After removal of the original liquor from the first boil-

Spread the Sunshine Inside



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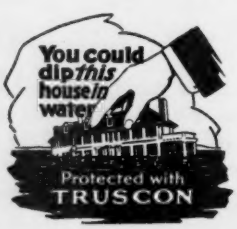
TRUSCON MAINTENANCE ENGINEERING



er, a second liquor containing 40 kilograms of caustic soda and 7.5 kilograms bisulphite is run in and heated until a pressure of three atmospheres is attained in the boiler, when it is passed into the second boiler, re-charged with alkali and bisulphite and heated as before, finally receiving similar treatment in the third boiler. The treated flax should then be well washed in the boiler with cold water. The use of a washing machine is not necessary.

A successful method of spinning a yarn has been found, containing 62.5 per cent of the cottonized flax and 37.5 per cent of the cotton.

A mixture of naphthalene sulphonic acid with caustic soda is also a most efficient cottonizing agent; as are also in less degree a mixture of ethyl alcohol and caustic soda, and a solution of sodium sulphide.

By adding sodium sulphide and sulphur to some of the waste liquor, evaporating and heating the residue for five hours at 200 degrees Centigrade, a product was obtained which dissolved in water containing sodium sulphide. Cotton dyed in the solution and then chromed acquired a fast dark-brown color. M. M.

A Plan for Saving Oil.

EDITOR COTTON:

The value of the oil wasted in many a mill might not pay the salaries of the superintendent and overseers, but it would be well worth saving. Some time ago I began checking up on my oil, first on the pickers, then the cards, and drawing, slubbers, speeders, etc., and it did surprise me to find how much I was permitting to be wasted in my department. So I began this plan:

I went into the picker room and said, "John, you try this gallon of oil this week. Now don't waste any of it. It's a special sample and I have eleven more gallons all different that I want you to try in the picker room." At the end of the week John came to me and surprised me by reporting, "Say, Mr. B., it didn't take near all the gallon of oil you gave me; what shall I do with the rest of this sample?" "Keep on using it, John, till you have used it all up," I told him. I was tickled, sure enough, because it had been taking from two to three gallons of oil in the picker room every week. Now it takes less than a gallon. We still use and will always have to use samples. I gave him some grease as a sample and got surprising results.

Feeling good over the results of my experiment in the picker room, I went to some more oilers, and said, "Boys, I've just started some sample oil in the picker room, and am getting mighty good results, so I decided to get you boys some to run for me on the cards, fly frames, drawing and shafting." Then every time I'd see the picker room oiler I'd say, "Be careful, John, don't waste any of that sample oil and grease," so he helped me tell the story. I would say, "Careful with that sample oil on the cards, Bill, it cost good money," and so on the drawing, I passed the good word to the fixer there. And then I took the oilers off the fly frames and put the oiling on the frame fixers. I called them to my office and explained what a good fixer oil was if put where it belonged and told them, "Now, boy, clean out every oil hole and try one or two drops of oil. But don't put in any more 'cause it won't stay; it will run out on the floor and be wasted, and our test will not be as good a report as the picker, and card, and drawing, and you don't want those fellows to get ahead of you, do you?"

A few days later I called in my shafting man and asked him how often he oiled the hangers. He said "I have no certain time, but they won't run hot on me for I keep 'em running over." "What!" I exclaimed. "Yes, sir," he answered, "I give them plenty of oil."

"Well, listen, Jack,' I said, "I have three gallons of a very fine grade of oil for shafting, and I want you to use it. Now don't waste it, be careful with it." Then I told him to not put a drop of oil in the hangers for eighteen days; so by and by he came to me and said, "Today's the day for trying the three gallons of sample oil you gave me." "Okeh, Jack," I told him, "and be careful with it. Try to make a good clean record so you can come up with a good report like the other boys have done and are doing."

Well, that was four years ago when I first took this job, and since that time we have cut our oil bill in the carding department in half! And the system will work for anybody else, just as well. A. B. (Ga.)

What Causes the Curl?

EDITOR COTTON:

We are making some Canton Flannels in 6, 8, 10, and 12-ounce weights, 34 inches wide. Our 6 and 8-ounce flannel is perfectly satisfactory, but on the 10 and 12-ounce we are having trouble with the goods curling. This is not at the selvages, but the cloth has a tendency to curl back when cut. This 12-ounce flannel is 13.50s warp and about 4s filling, 72 x 40. We have made some 64 x 36 and this also curled. The napping has nothing to do with the curling as the cloth will likewise curl before being napped.

We have tried weaving this with the warp slack and also real tight, and see no difference. I have noticed in these heavier weights that the filling does not run perfectly straight across the cloth but in some cuts is at a slight angle. This we do not think is caused by the nappers, but do not see how the loom could cause it. Would the filling being this way cause the curling?

I should appreciate some information from your readers, with any suggestions they may have for remedying the difficulty. A. S. E. (N. C.)

EDITOR COTTON:

"A. S. E." has asked a question that has had me guessing for a long, long time, and long ago I decided it was a problem that the finisher had to contend with—though I have never acknowledged to myself that this curling of when cut cannot be stopped.

This curling is usually on work where one yarn differs

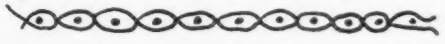


Fig. 1

a great deal from the other; for example, "A. S. E." uses 13½s warp and 4s filling. I am sure that his cloth curls warp way. Herewith are a couple of sketches to try to give an idea of what I mean.

Figure 1 shows a cloth in which the filling is nearly equal to the warp in size. Figure 2 represents about how a 13s warp and a 4s filling would be. The warp in this figure shows that the cloth has got a good start to curl because the loops are larger, giving it an effect something

like a shaving. The shaving from a plane is longer on one side than the other, consequently it curls when leaving the plane, and in making a face, or cover, for the cloth, we pull the top shed tighter than the bottom, with the result that the cloth has a tendency to curl up the shorter length or face side.

Some samples of cloth are sent with this to illustrate my meaning. I do not know just how these pieces of cloth will act when you receive them, but if they are in the same condition as when they leave here you will note that in separating them and throwing them on your desk face up, the first two will curl the filling over the warp

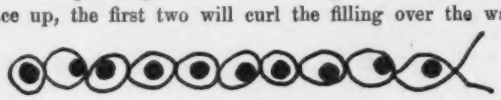


Fig. 2

face. The third should not curl as the filling is lighter. The two samples of napped goods are both the same fabric, one dyed and the other not dyed. If there is a tendency to curl in these two pieces they will curl from the warp edge over the filling, though this warp number is 12.25s and the filling 6s, but you will note that this warp is drawn two ends in an eye, and being a broken twill we do not have to work so much for face, and it is nearer a fifty-fifty proposition. This fabric in the gray does not curl.

It has been a long time since I saw a loom put in a pick on an angle, as I find an automatic loom has to be kept with the lay lined up, but on the plain loom I used to have to quite often line the lay up with the breast beam. I am positive that this slight angle in the picks did not cause curling in the cloth. E. L. P. (Ga.)

To Secure the Cost Per Pound Per Number.

EDITOR COTTON:

I desire to know if there is any short method, which is approximately correct whereby you can ascertain the cost per pound per number (manufacturing cost) where the poundage and average cost is given, on yarn; or where the poundage and total manufacturing cost is given.

For instance, if you have 300,000 pounds of yarn on which the total manufacturing cost is $30,000, and this lot of yarn is made up of numbers 4s to 20s inclusive—consecutive, 4s, 5s, 6s, 7s, etc.—15,000 pounds to each number, what is the cost per pound of each number, or the plus cost of each number over a 4s?

M. V. F. (Ga.)

EDITOR COTTON:

In answer to "M. V. F.," it is our experience that it is practically impossible to ascertain the cost per pound by counts from the total pounds of yarn and the total cost of production. Since different counts of roving will be employed for the making of the various counts of yarn, it is easily seen that the cost through the card room will vary widely. In the spinning room the production per spindle varies widely by counts, and is governed largely by the staple and grade of cotton used and the number of twists per inch inserted.

For these reasons it is necessary to make a detailed study of draft lay-outs and productions in order to obtain an accurate estimate of the costs by counts. Other methods of obtaining the costs by counts are arbitrary and inaccurate.

Accurate costs may be obtained in a textile mill without complication or additional clerical help. It is, however, quite important that a study of the conditions existing in each individual plant be made, since each plant has its own peculiar problems. J. B. G. (Mass.)

Some Mill Kinks.

EDITOR COTTON:

It has been found that to have the draft gears on the spinning frame at the foot end, where these are used on long frames, about 20 teeth apart—for instance, if the draft gear is 46 teeth, have the one on the other end of the rolls 56 teeth—that the drafting of the roving seems to be equalized and it is stronger and runs better, both on spooling and on warping, and by test on breaking strength, shows about four pounds stronger yarn on the warp bobbins at the testing machine.

Another thing that will produce better strength in yarn is to wax the spinning bands when being tied on by holding a piece of wax in the hand and letting the band run through it, waxing it as it is running. A good coat of wax preserves the band and makes it last longer, saving the weight of stock used in the making of the bands. Anyone who has not tried this will be surprised by the results. Someone may say there will be too much slack yarn, but I have tested it on a run of six months, which showed three bobbins per thousand in six months, on both warp and filling. Of course there may be some doubt as to the invisible slack yarn, such as soft places in the yarn which break at the spooling, warping, slashing, tying-in machine and loom, or in the filling in the shuttle, but as there is a good production from the looms, with an above-the-average satisfied set of weavers, we believe we have improved things.

Putting up seven strands of drawing sliver at the back of the coarse and fine (or second) drawing frames has proven to add about six per cent to the strength of the yarn, and on 30s to 50s that makes quite a showing in the spinning room, as well as in the weaving.

In overhauling spinning frame rollers, after several years' wear, it has been found that to take the rolls from one side and lift them over to the other side gives them a fresh, unworn flute to work with. This puts the roll to work on the edge that has been following the drive side of the fluted roller, and gives a fresh, clear flute, almost like a new fluted roller, with very satisfactory results.

Very low spooler speed has been found to be more satisfactory than a high speed as it assists the yarn to stay up rather than come down, which means that a knot will not have to be tied. The more knots the more likelihood of a bad place, or another knot will have to be made to overcome the stoppage of the preceding frame. The thread guides should be drawn down to as fine a gauge as can be gotten by with, and the lumps and gouts will not be overly large, with the probability that there will be less trouble and will be in better condition if allowed to get by this way than to have them drawn down very much finer and have to contend with the extra knots.

Same on the warpers. We too often think that when

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the warpers are not keeping up they need speeding up. In some cases this may be so, but when a warper is running at the rate of 3,000 yards per eight hours it is fast enough. If the operative will do his or her duty the production will be forthcoming. A balance wheel weighing from 12 to 15 pounds will assist the warper in running more smoothly if it is put on the top cone at the end farthest from the driving pulley. If possible have this wheel about 12 to 15 inches in diameter, with about an inch face, using a spoke pulley blank. Keeping the lost motion worked out of the mesh of driving gears and pulleys at the head ends, will aid materially in the running of the warper. We recently worked over all our train of gear driving pulleys, at the driving end of the warpers, and it made them stop, and start off a lot easier, leaving off the usual jerk and thus breaking down of ends. The less ends gotten up, the less liability there is for crosses and laps on the warpers, which means less trouble in slashing, and aids to a better production. T. A. E. (Ga.)

How to Design the Breaking Strength of Cotton Yarn.

EDITOR COTTON:

Good engineering is to design. The famous Hudson River bridge was first put on paper and then built up accordingly. The same was true with the world's highest building. In fact, it is true with all the big engineering projects. If that is true, why not with cotton manufacturing? A friend, not without reason, states that you could not work cotton to a hard and fast rule, because the nature of cotton is so varied. But he has overlooked one point in this consideration. I refer to the fact that we have only one material to work with while in others they have to deal with scores of materials whose natures are just as varied or perhaps even more. The way they have worked out their salvation in other branches of engineering should be a very good example for us to follow in our branch, cotton manufacturing.

In the preface of the famous work, The Materials of Construction, the late Prof. J. B. Johnson stated: "The mechanical properties of the materials to be employed to accomplish the objects sought do not rest on any deductive science, as this information can only be gained by patient, expensive, and competent research." Lest that we should be discouraged, Prof. Johnson reminded us that, "it furnishes very much great rewards to the skilled investigator." Upon this statement lies the salvation of the present-day engineering. Is that not enough to point out what we should do in order to elevate our cotton manufacturing branch of engineering to the same level with other branches? What I mean by that is to find a way out so that in spite of the fact that cotton is not the same in character, we can still design the yarns to serve different purposes before we actually go through the processes of making them; and particular reference is made to breaking strength.

Our thanks are due to the earlier investigators and inventors that today we are perfectly at ease to design what drafts, weights, and hanks, etc., to use at different processes to make certain yarns. As cotton spinning machinery is almost standardized up to this time, we are inclined to take things as they come to us without any question. To illustrate my point, let me ask how many readers of COTTON, whether overseer or superintendent, know exactly what the square root of the number and the twist multiplier means. Although this very problem was taken up in the June issue and again touched in the article, "A Unit of Hardness of Yarns," which appeared in the October issue of COTTON. A matter-of-fact attitude is fatal to progress. As soon as investigation ceases, progress ceases. The purpose of the present letter is intended to stimulate the interest of the readers to investigate. Then and only then cotton manufacturing, as a branch of engineering or of business, will be benefited at large as well as the individuals who contribute their shares in the investigation. I hope that from the foregoing remarks the readers will see the reason why the balance of this letter deals only with some fundamental considerations of the subject, the breaking strength of yarns, rather than to give a rule as to how to go about it without knowing why.

We all agree that evenness and strength are the first considerations in cotton manufacturing. As in any other branch of engineering we must have experimental data to work with before we can design anything. So experiments and the collection of data will be our first move here in our discussion of the strength of yarns; how to experiment and what to collect. The factors that have direct influence upon the breaking strength of yarns are:

1. Cotton (including grade, staple, etc.).
2. Number (or count of yarns).
3. Twist angle (or twist multiplier).
4. Moisture content.
5. Processes (like combed yarn, carded yarn, double roving, single roving, doublings . . . and drafts at different machines, etc.).

Very little need be said about the fact that the stock (or cotton) used has a marked effect upon the breaking strength of the yarns made. That the number has an effect over the breaking strength is equally evident. 20s yarn has a much higher breaking strength than 100s. As to the third, I used the twist angle (or twist multiplier) instead of "twists" (or twists per inch). The reason why "twists per inch" can not be used for the unit of hardness was explained in an article entitled, "A Unit of Hardness of Yarns," in the October number of COTTON. The twist angle is best to use because not only the angle is constant but also it portrays in what manner it exercises its influence upon the strength of the yarn. The twist multiplier can also be used because it is nearly proportional to the twist angle and the variation is so small that for all practical purposes it can be neglected. The fourth and fifth factors are familiar to all.

Having considered all the factors, our next step is to go a little further and see what influence each factor exerts upon the breaking strength of the yarn. To have a complete knowledge of the breaking strength of yarns requires a thorough study of each individual factor named. It is quite essential for us to know all the conditions in order that a comparison of the final results can be made. To record only a part of the total might prove misleading as well as useless. For instance, if one investigator gives the 20s skein break to be 100 pounds and another one arrives at 88 pounds, unless other factors are all known, we are absolutely helpless to try to make any comparison between

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the two. Because we don't know what factors they have in common and what causes the 12 pound difference. In studying the influence of each individual factor we can keep the rest always the same and vary only that particular factor. Its influence will soon be revealed, whatever it is. From such individual studies a general theory can be and has been found which takes in all the factors. This formula, although experimental in nature, agrees well with that arrived at from purely theoretical considerations. I will not go through the mathematical proof of the formula. To do that requires a little knowledge of higher mathematics and that of theoretical mechanics, which may not be quite so familiar with the average reader. But I will write down the formula and try to explain it in plain English so as to make it understandable by all. The formula follows:

$$B = \frac{a}{C} + K_t \quad K_m \quad .... \quad ... (1)$$

Where B is the skein breaking strength in pounds;

"a" is a constant depending upon cotton and processes used.

K_t is a constant depending upon the twist angle.

K_m is a constant depending upon the moisture content.

C is the number or count of yarns.

If we choose K_m to be unit when the ordinary moisture content is to be found in the yarn, our equation becomes—

$$B = \frac{a}{C} + K_t \quad ... \quad ... \quad ... \quad ... (2)$$

To put this into words: The skein breaking strength of any yarn containing an ordinary amount of moisture made out of certain cotton with certain processes and a certain twist angle (or twist multiplier) is equal to a constant ("a") divided by the number of the yarn plus another constant, (K_t) due to the twist angle. While "a" is due to the stock and processes.

These constants have to be determined by experiment. Draper's table of skein breaking strength as published in "Textile Texts"—4th edition—was calculated by the formula (2). They found the value of "a" to be 1,900 for yarns made of American cotton, single carded, double roving at back of spinning. $K = +1$ for twist multiplier 4.75 approximately; and $K = -13$ for twist multiplier 3.25 approximately, assuming in all cases the moisture content to be ordinary.

But as they stated in the text, it represents a rather high average, and it can be used only for a rough comparison. In order to use the data for a particular purpose in a particular mill these constants have to be determined individually, just as civil engineers have to do their designing to meet their particular needs and mechanical engineers have to test the strength of the materials that go into their particular machines.

After all it is a very easy matter, if you have grasped the idea. It is nothing more than the tests we use right along in the mills. You will notice that all we need in the formula is the skein break in pounds and the number of the yarn. But don't we all know at what our yarns are breaking? By that I mean don't we all test the breaking strength of yarn after we make it? Don't we all size our yarns? And that is all what we want. Of course, we have to know the twist angle, or twist multiplier, in order to determine K_t. But all that we have to do is to find the twists per inch and divide that by the square root of the number of the yarn under consideration. The moisture content is very easy to find. The stock and the processes are quite familiar to all. The latter two are particular factors for particular mills. That is why a general average won't work. But it is nothing at all for that particular mill to determine what it is.

This article is logically connected with the writer's "Unit of Hardness of Yarns." The readers will remember that the writer has proposed to use the twist angle as "A Unit of Hardness of Yarns." Now he wants to make a further proposal in order to render the table more useful; that is, to add another column giving the value of K_t along with the corresponding twist angles. Then we will connect the unit of hardness of yarns directly to that of breaking strength of yarns. In doing this, however, care should be taken to record all the necessary factors. Otherwise, the table will be useless.

For the time being I will not attempt to give a set of K_t's in the table, because the factors are so varied in different mills. But as I said, it is a very easy matter for a particular mill to make up a table of its own. The time will come when a standard value of each factor above mentioned will be agreed upon. But that comes only through exhaustive and competent tests. I think that the Cotton Manufacturing Associations and other similar Institutions are suitable bodies to take the matter up. So I will leave to them these interesting undertakings.

H. H. Y. (Mass.)

How Much Will Incrasing Ring Sizes Increase the Frame Production?

EDITOR COTTON:

I would like to ask some of the readers of COTTON, through the "How Other Men Manage" department, to solve the following problem for me:

Recently a mill decided to change the size of rings used in spinning, with a view to getting more production. The diameter of the rings formerly used was 1⅜ inches, producing hosiery yarn, and the frames ran an hour and forty-five minutes to fill the bobbins before doffing. The size of the new rings is 1⅝ inches in diameter. All speeds and other conditions remain the same as before the change. I should like to know how much longer these frames will run to fill the bobbin before doffing after changing the rings to the larger size.

W. V. J. (N. C.)

Some Answers for "W. V. J."

EDITOR COTTON:

In response to the questions of "W. V. J. (S. C.)"—

The average filling bobbin spun on a ring frame, with a 1⅜-inch ring contains 325 grains of yarn, and as built for the shuttle is built by filling build motion, as if spun on a 1⅛-inch ring, giving an average diameter of the filling bobbin of slightly over an inch.

⅛ = .125

1⅛ = 1,125 squared = 1.27

1⅜ = 1.375 squared = 1.89

1⅝ = 1.625 squared = 2.64

1.27 is to 1.89 as 325 is to 485.

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of the 1⅜-inch ring, the bobbin would contain approximately 485 grains of yarn. This figure would increase to approximately 500 grains, due to the fact that you are spinning on the larger diameter.

1.89 is to 2.64 as 500 is to 700.

That is, if the filling is spun on a 1⅝-inch ring spun to the full capacity of the ring, the bobbin would contain about 700 grains of yarn. This figure would also increase to approximately 750 grains, due again to the fact that you are spinning on the larger diameter. The diameter of the bobbin barrel will necessarily be practically in proportion to the increased diameter of the ring, and therefore, does not need to be considered in this estimate.

It takes two hours and forty minutes to fill the bobbins as built for the shuttle, or 160 minutes, according to "W. V. J."

1.27 is to 1.89 as 160 is to 238.

238 divided by 60 equals three hours and 58 minutes to fill on the 1⅜-inch ring, if built to the full capacity of the ring.

1.89 is to 264 as 238 is to 332.

332 divided by 60 equals five hours and 32 minutes to fill on the 1⅝-inch ring if built to the full capacity of the ring.

These figures of course can only be considered as an estimate, as to get at the actual weight of yarn on the bobbin, and the actual time to fill, one must necessarily take into consideration the full conditions under which the yarn is spun, and take into consideration such facts as front roll speed, diameter of front roll, spindle speed, weight of traveler, size of bobbin, etc. etc. T. W. M. (Mass.)

EDITOR COTTON:

I have delayed in answering the question on sizes of rings, because I have been making some tests along this line, and I thought I would wait and give your reader the benefit of these experiments.

We have two sizes of rings here at our mill—1¾-inch rings, and 2⅛-inch rings. We run our 20s yarn on the 1¾-inch rings and the frames run two hours and forty-five minutes.

When the mill was started it was equipped with 1¾-inch rings, and when they enlarged the mill the 2⅛-inch rings were put in. We use these large rings for making 10s, 11s, 12s and 13s. We have run 16s on them, and they run just as good as on the small rings.

I find that I can get about five per cent more production on the large rings than on the small rings.

"W. V. J." wanted to know how much longer the frames would run after changing his rings. I can't say just how much longer the frames would run, but I can assure him that they will run longer, and he will get a better production—that is, he will get more per spindle—on the larger ring than on the small ring. At least that is my experience.

I don't think it would pay to bore out the ring rail, and put on larger rings and separators. If a larger ring is wanted I think a wider gauge frame should be used.

I think the largest ring possible without the work running bad, is best, because the less a frame has to be doffed, the more it will get off.

We run the frames with the large rings at the same speed that we run those with the small rings, and the work runs just as good on the large rings as it does on the small rings—that is, on the coarser numbers, and we get about five per cent more production on the large rings. I have tested this out since reading "W. V. J.'s" question, and that is what I find.

I would not advise anybody to try to run anything finer than 20s on a ring larger than 1¾ inches, but I would advise anyone making 20s hosiery yarn to use a 1¾-inch ring if possible. On yarns heavier than 14s, I would use a 2⅛-inch ring. S. C. H. (Ga.)

Inserting the Twist in the Yarn.

EDITOR COTTON:

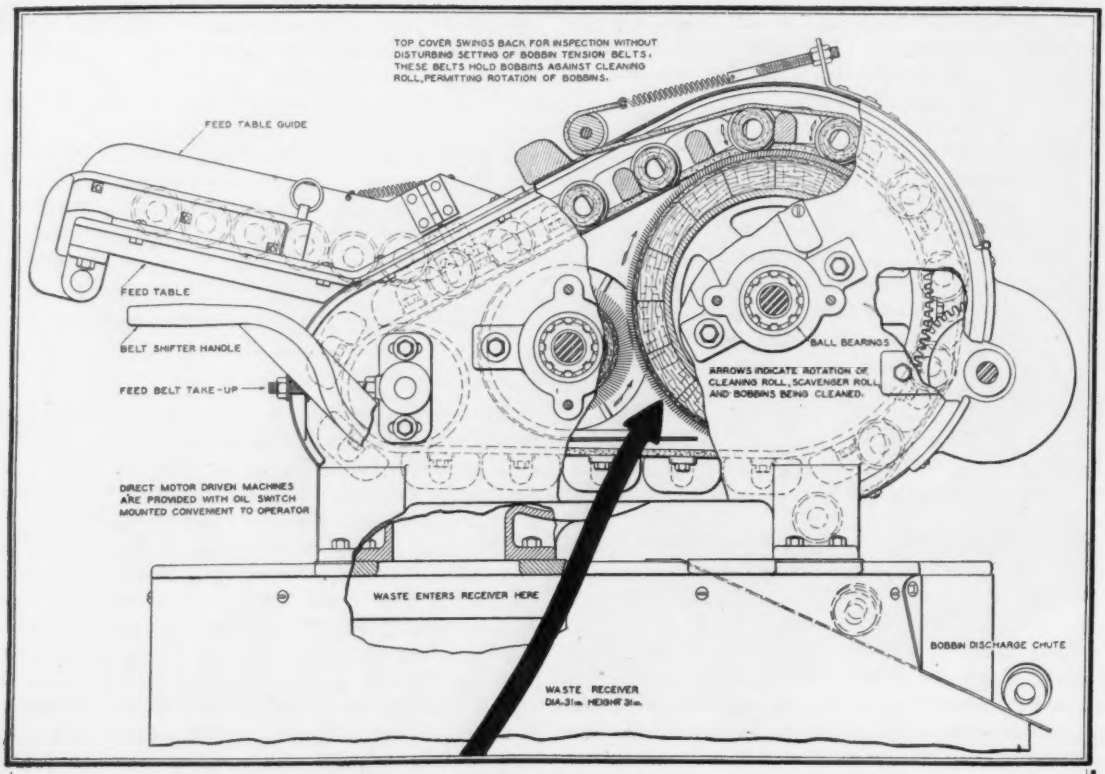
The question has been raised: which inserts the twist on ring frames, the traveler or the spindle?

I agree with those who say that it is the traveler, not the spindle, that inserts the twist. As much has been said about the spindles on the mule inserting the twist, I will ask why it is possible on the mule, and impossible on the ring frame for the spindle to insert twist? Considering the mule it must be remembered that this machine is not constant but intermittent spinning, that is, the drawing and twisting is separate from the winding. In other words, when the twisting operation is being performed on the mule there is not any cop being built and when the winding is in action there is no twisting, but with the ring frame both winding and twisting are performed at one and the same time.

Let us consider the mule and find out why the spindle inserts the twist. There are three points in connection with the winding and twisting. They are: the inward and outward movement of the carriage, the position of the spindles to the roller, and the faller wires. On all mules the spindles are inclined, having their top point nearer the roller than their lower or base end. The rollers are somewhat higher than the spindle point, and thus when the stock being delivered by the roller is freed by the action of the faller wires it is then under the direct rotary motion of the spindles. The winding and twisting operations are as follows: When the carriage completes its inward run, the counter faller will descend out of the path of the yarn, and the winding faller will ascend out of the path of the yarn. During this operation there will be a few open coils of yarn on the spindle blade from the nose of the cop to the spindle point, when the faller assumes that position the roller will start to delivering and the carriage commences its outward run, the spindles will begin to revolve and at each revolution of the spindle the yarn will coil around the spindle point and slip off thus inserting one turn of twist for for every revolution the spindle makes. This continues throughout the outward run of the carriage.

When the carriage completes its outward run, the roller will stop delivering, the spindles stop and then revolve in the opposite direction and uncoil the few open coils of yarn on the spindle blade. During this operation the counter faller will ascend and the winding faller descend. The carriage will then begin its inward run, the spindles will revolve as when twisting, and the spun or twisted yarn will be guided on the spindle by the winding faller and held under tension by the counter faller.

This completes the operation of twisting and winding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BALL BEARINGS
ARROWS INDICATE ROTATION OF CLEANING ROLL, SCAVENGER ROLL AND BOBBINS BEING CLEANED.
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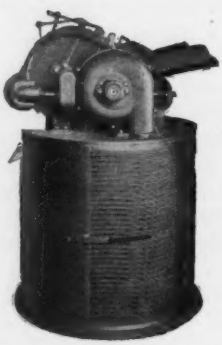

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on the mule spinning frame, and the ring frame is subject to consideration. Here we do not find that the yarn at any times comes under any direct twisting action of the spindle; instead it is wound direct on the bobbin. Owing to the direct passage of the yarn onto the bobbin there cannot be any turning of the yarn upon its axis, which is necessary to put in twist.

The twist is therefore put in by means of the rotations of the traveler at a defined relative velocity during the delivery by the rollers of a definite length of yarn. In short, the traveler performs the same functions as the flyer eye of of the throstle frame, or the presser eye of the roving frame, and the twist will be the number of times the traveler travels around the ring per minute, divided by the inches delivered per minute by the roller, thus: Assuming the roller to deliver 471 inches per minute, and the bobbin to be ¾ inch in diameter, and the spindles to make 9,000 revolutions per minute:

$471 \div (3.1416 \times \frac{3}{4}) = 200$, which will be the revolutions of the bobbin taken up in winding on this stock delivered, and if the bobbin is making 9,000 revolutions per minute, the traveler will make $9,000 - 200 = 8,800$ revolutions, as it is being carried around the ring by the yarn. This will have exactly the same effect as if 471 inches of yarn were held firmly at one end and the other end twisted 8,800 times. Thus the twist per inch will be $8,800 \div 471 = 18.68$ turns per inch. When the bobbin is empty the twist will be less than when full due to the angle of the yarn across the ring.

As it is not practice or practical to remove any part of a machine in order to outline its action, I have attempted to outline the machine as in good repair and ready to spin yarn.

T. A. A. (S. C.)

The Winding Operation on Ring Frames.

EDITOR COTTON:

In seeking to understand the manner in which the traveler inserts twist in the yarn, it should be remembered that the bobbin on which the yarn is wound revolves at a high rate of speed, and that this speed is constant throughout the building of the bobbin; also that the front rolls deliver a constant length of yarn. Suppose, for illustration, that the bobbin is ¾ inch in diameter, and that it makes 9,000 r.p.m.; also that the front rolls are delivering 471 inches of yarn in one minute. Then the tendency of the bobbin will be to wind on $\frac{3}{4} \times 3.1416 \times 9,000 = 21,206$ inches of yarn in the same time that only 471 inches is delivered.

This will necessarily result in the yarn being broken between the front rolls and the bobbin. If, however, the yarn is passed through some such mechanism as the traveler that revolves with the bobbin, one of several possible results will take place: if the traveler makes the same number of revolutions per minute as the bobbin, no yarn will be wound on the bobbin; if the traveler makes a number of revolutions equal to the number of revolutions made by the bobbin less the number of revolutions required by the bobbin to take up the yarn delivered, the yarn will be wound on the bobbin and at the same time twist will be inserted in the yarn.

Since the bobbin tends to wind on itself more yarn than is delivered, a tension is maintained in the yarn, and this tension being transmitted to the traveler causes the latter to revolve around the ring. The traveler is just sufficiently heavy to make it necessary that the yarn exert some strain before causing the traveler to revolve, and yet this strain is not great enough to break the yarn.

If the front rolls deliver 471 inches per minute and (the bobbin is ¾ inch in diameter, $471 \div (3.1416 \times \frac{3}{4}) = 200$, nearly.

Nearly 200 revolutions of the bobbin will be taken up in winding on the yarn, and the traveler will make $9,000 - 200 = 8,800$ revolutions as it is carried around by the yarn.

This will have the same effect as if 471 inches of yarn was held firmly at one end and the other end twisted 8,800 times, and will give $8,800 \div 471 = 18.683$ turns per inch in the yarn. Hence in ring spinning frames the following conditions exist: a bobbin revolving at a much higher rate of speed than is required to wind on the yarn delivered, and a traveler introduced that compensates for this excess speed by revolving the yarn at a slightly less speed than the bobbin. Since the diameter of a full bobbin exceeds that of an empty one, and since the bobbin makes the same r.p.m. throughout the time that it is being filled, its circumferential speed must be greater when full than when empty, consequently when the bobbin is full the traveler will be making more revolutions per minute and putting in more twist than when the bobbin is first started after doffing. The difference, however, is so slight that it is not considered in the construction of ring frames, and consequently there will be found no device on these machines for equalizing the twist in the yarn. N. B. (Mass.)

An Opinion on Stripping.

EDITOR COTTON:

The mill without the vacuum stripping system is to be compared with the mill without humidifiers.

The law of compensation is never still and mistakes must be paid for.

Very recently I had the pleasure to visit a large cotton mill where the stripping of the cards is done by a stripping roll. When I asked the superintendent why he did not adopt the latest vacuum system of stripping, I was surprised to receive the following reply: "Why, the stripping roll strips as well as vacuum, and it is a waste of money." I said nothing, but as he is a subscriber to COTTON, he may read the following, which I hope will change his mind.

As a rule, stripping brushes will not strip as well on the side edges of the card clothing of both the cylinder and doffer unless the fillet on the brush is renewed about every week. There is a certain amount of foreign matter left at this point which finds its way to the web. Then the very men who reject the vacuum system will say, "I wish I could get combers that will comb the neps from the stock." There is nothing that will cause more neps in the finished yarn than poor stripping. The foreign matter referred to that is left on the edges of the cylinder and doffer and is so small that it escapes the action that it goes under in the preceding processes. However, there are different kinds of vacuum stripping systems, and all manu-

facturers should be careful and equip their cards with the best.

It was only a few weeks ago that I saw this system for the first time, and to my mind, it is superior to any I have previously seen. What I like about it is that it is out of the way and never bothers in case of grinding. Besides, it is impossible to see the least amount of dust when the card is stripped, which is different from some of the vacuum stripping systems on the market. Wash (R. I.)

Wants a Piece Rate Method for Tying-in.

Editor Cotton:

In intend to work out a piece rate for operators on the Barber-Colman tying-in machine. I have several ways in mind of doing this but would like to have, through "How Other Men Manage," the opinions of men who have put a piece rate into effect already, and secure their experiences, the manner of paying, whether by loom beam or so much per thousand ends? G. A. M. (S. C.)

Paying for Tying-in Machine Work.

Editor Cotton:

In regard to paying by the piece on Barber-Colman warp tying-in machines, brought up by "G. A. M.," an advance copy of whose letter was sent me, I wish to advise that the best method we have found for this work is as follows:

As all loom beams do not have the same number of ends, we have found it more satisfactory to pay so much per thousand ends.

When the loom beam is slashed, we have the slasher man to place a tag that is perforated in the center, and show on this tag, on both top and bottom, the number of the yarn, and the number of ends.

When the warp is tied, we have the tying-in man tear the bottom tag off as a check for his work, the remaining half of the tag is left on the warp, and goes to the loom.

M. B. (Ga.)

Editor Cotton:

I note that "G. A. M." would like to get some information as to working out a piece rate system for payment of the operation of Barber-Colman tying-in machines. I have had a wide experience with these machines, covering a period of about 15 years, and in my opinion the best way to work out a piece rate for operators on these machines is not to pay by the piece at all, but to pay a fair daily or weekly wage and insist on a fair daily or weekly production. One operator and one helper, tying-in warps averaging 2,000 ends or more, should secure without any trouble a production of at least 10,000 ends per hour. The greater number of ends per warp the easier it is to get the 10,000-end production. A lesser number of ends per warp require more frequent changes, and to get a 10,000-end production per hour would require the operator and helper to be strictly on the job in unloading and reloading the machine, as it is plain that when the machine is stopped it is not piling up production.

These machines operate at a speed of from 250 to 260 knots a minute, and the average time consumed changing warps should not be above three minutes, and I know of several instances where the time for changing warps is considerably less than three minutes.

If a piece work rate is to be paid it should be based on a price per thousand ends tied. It requires considerable oversight to have a piece rate system work out satisfactorily, to guard against the sacrificing of quality in the warps tied for quantity. It is possible for an operator to so slight his work that the warps that are sent to the weave room will not be in the best condition for weaving, and any slight gain that might be made by paying piece rate wages in the tying-in room would be more than lost through poor weaving warps in the weave room.

A piece rate system also requires considerable oversight in ascertaining the number of ends that have been tied each day or week, upon which the operator's and helper's pay is computed, and in my opinion the only satisfactory way is to have special tickets printed containing a coupon, upon which should be printed the style number, this coupon to be retained by the operator and turned in at the end of each day. The overseer or the clerk then could compute the number of ends tied from these coupons.

Whenever the piece work system has been tried out it has been my experience that its benefits were very much open to question. There is always more or less haggling over who should pay for a warp that is to be re-tied that might possibly be spoiled in the tying by the operator's carelessness or something happening to the machine, or possibly reaching the weave room in a damaged condition through no fault of the operator.

As I said before, I am firmly convinced that the best method of paying operators on the tying-in machine is by the day or week and insisting on a fair day's work of the best quality for a fair day's wage. H. T. P. (Mass.)

Editor Cotton:

Referring to the inquiry in regard to putting tying-in machines on piece work, will say that I have experimented a great deal along this line, but doubt the advisability of putting these machines on piece work.

Of course, there are a great many arguments pro and con about piece work. I am a very firm believer in putting everything on piece work that is practicable. However, there are some few things in the mill where there is a question as to which is the better method, and of course, local conditions affect these things at different mills.

As stated, I seriously doubt the advisability of putting tying-in machines on by the piece, or putting slashers on piece work. Here are two processes at which there is likely to be a great deal of bad work, and the very fact that a slasher man, or a tying-in man, handles such a great volume of yarn in comparison to the dollars expended makes what little saving that might be secured by piece work a very small item in the cost per pound. In fact, the slashing and drawing-in of an average print cloth mill will not average over four mills to five mills (or about a half a cent) per pound of product produced. (Understand, this is the cost of slashing and tying-in together.)

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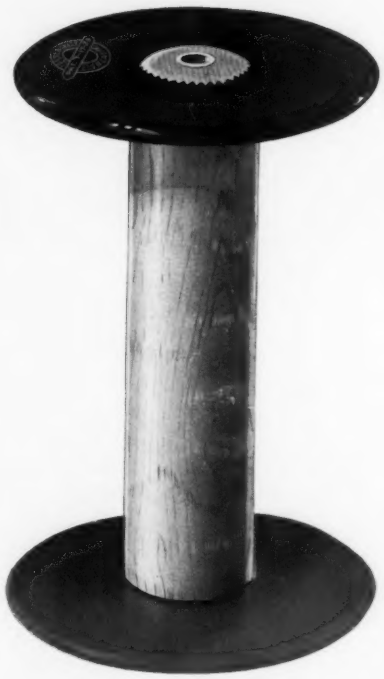

When this occurs the spool is a dead loss. The yarn—worth several times the cost of the spool—is wasted; for salvaged yarn sells for about one-fifth its value.

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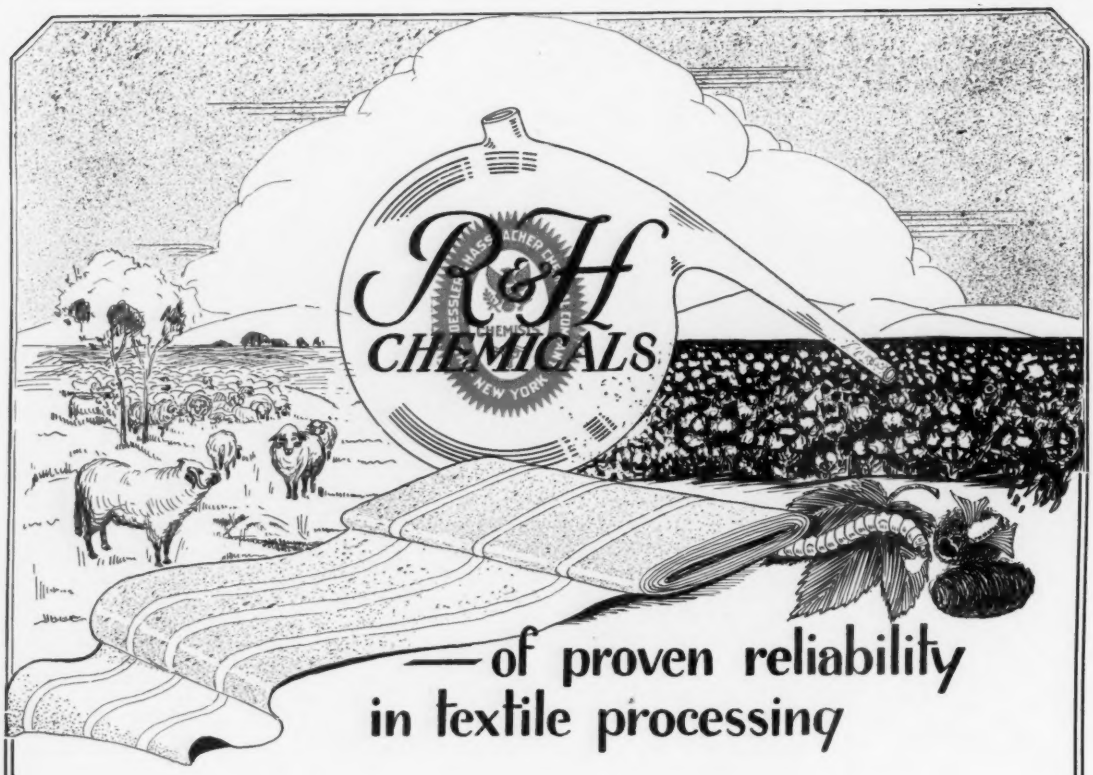

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This is the custom for the average mill to have these under one item on the cost sheet, and it so happens that they are pretty equally divided in the average mill. Therefore the cost of tying-in should not be over two to three mills, or less than one-fourth cent, a pound.

There are a great many ways to check up on the production of tying-in machines. One of the best ways I have found is to keep a record of the total number of ends each machine ties per day, and figure the percentage of production. The speed of the average tying-in machine is supposed to be about 250 knots per minute. Based on this speed as a 100 per cent, the average operator should make around 60 to 65 per cent production without a helper.

Where a mill has 100,000 ends per day to tie in, it will probably pay to use a helper on the machines. However, where a mill has enough tying-in machines to get along without the helper, they will get the tying-in done much cheaper than by using the helper.

I have been unable to increase the production of the machines more than an average of 15 per cent by putting on a helper, therefore, this 15 per cent increase in production will cost more per 1,000 ends than what the operator could do by himself.

All the foregoing information has been based on machines that are tying five or six styles of goods per day. These styles of goods range from 56 x 44 to 80 x 80 goods. You, of course, realize that we could put machines on 80 x 80 goods alone and raise the production on this machine, because there would not be as much doffing, and a man can always make a higher percentage by tieing warps of 3,000 ends than he can by tieing warps of 2,000 ends.

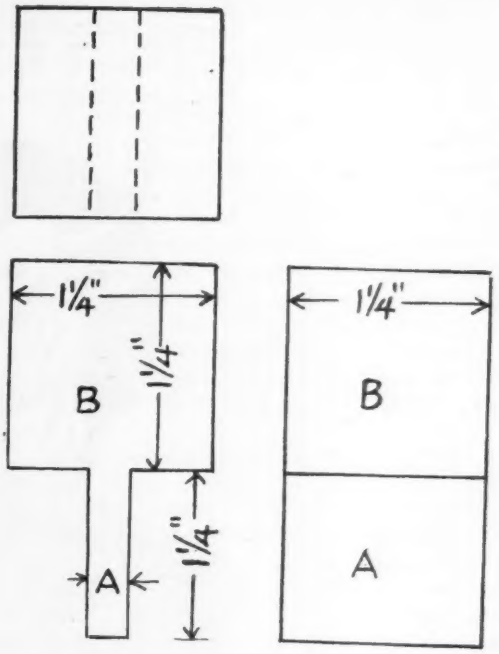
K. D. T. (S. C.)

Some Gauges and Their Uses.

EDITOR COTTON:

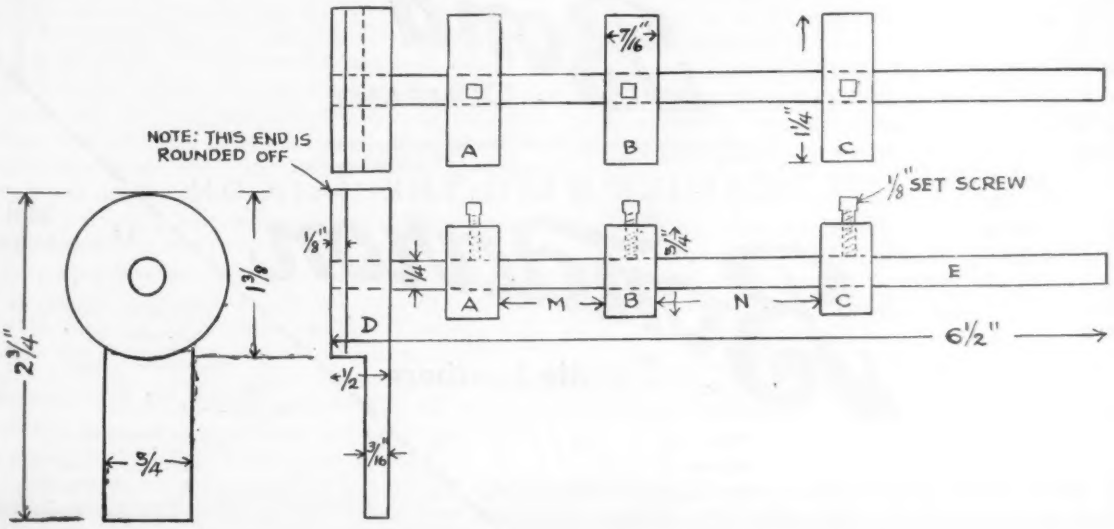
In connection with the discussion on "M. R. K.'s" question of how to measure roll settings, I submit herewith sketches of three gauges I have found very practical.

The nib gauge can be made from brass, with the exception of E, which is made of steel. It is used for setting the nibs on fly frames. To use: place the flat side of D up against the steel roll, first having set A, B, C to whatever setting is desired. That is, set A and B to distance desired—if 1¼-inch setting is desired, set the distance M to 1¼ inches, and then set the distance N as to need. Thus A, B, and C should set inside nibs.



The roll gauge can be made either of steel or brass. To use it, insert the section A between the steel rolls, and section B will hold it from falling through. To find the gauge needed, say on 1-inch front roll and 1-inch second roll, add the two radii, ½ + ½ =1 inch. If desired to set the rolls 1¼ inches from center to center, use a ¼-inch gauge, that is, a gauge that measures ¼ inch across A. This A may be made up in different thicknesses from 1/16 inch, graduating up to any thickness required. This gauge may be used for setting rolls on all card room machinery.

The roll gauge for the top and bottom rolls on a spinning frame is a steel gauge made in consequent thickness. The two sketches of it show it to be three inches long and one-half inch wide and one-quarter inch thick. This latter



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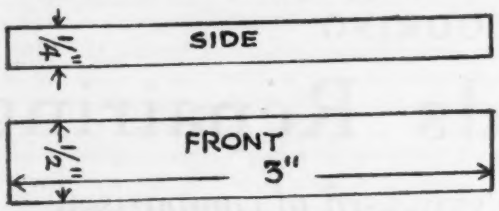
dimension may be in varying thicknesses from 1/32, 1/16, ⅛, 3/16 or ¼ inch, and so on, for whatever is needed.

For the bottom steel roll this gauge is inserted between the first and second roll stands and for the top roll nibs it is inserted between the first and second nibs.

To find the correct gauge add the radii of the first and second rolls to the thickness of the sides of the first and



second roll stands. Thus if it is desired to set the first and second rolls to 15/16 inches with one-inch first and second rolls and stands that are ⅛ in thick, a 1/16-inch gauge would be used.

These gauges can be numbered thus: 1/32-inch gauge, No. 0; 1/16-inch gauge, No. 1, etc. Then a list of correct gauges for the roll settings may be made up and the settings of rolls greatly simplified. The same method is used for setting nibs. W. O. R. (Mass.)

College Men and Cotton Mills.

EDITOR COTTON:

For the past several months COTTON has afforded its readers no small amount of interest by publishing several articles relative to the capabilities of the modern college man in a cotton mill. This is a subject that is well worth some serious consideration, and affords several clear cut channels of thought. Consequently, let us view this topic from a different angle. In buying a Ford or an automobile, no one would glance at their prospective "agony wagon" from one side and then close the trade. On the other hand, said purchaser would perambulate through, under, and around the object of his interest several times in order to thoroughly acquaint himself with all details and particulars thereof. Likewise let us get another angle of sight on the subject now confronting us.

"The College Man in a Cotton Mill"—this is the form upon which several recent articles have been based. In analyzing this subject let us try something like this—"The Cotton Mill Man in a College." Now don't get excited at that. I do not intend to draw an imaginary picture of operatives, overseers, and superintendents laying down their work and entering college as a means of prying open the majestic portals to new learning. In the life of every man there is one thing that he can do better than anything else. There are also various ideas as to the real meaning of success in life. Some of these ideas put the accumulation of wealth above all else in their definition of success, while others find success in the personal knowledge of duty well performed. Be a man's idea of success what it may, he will never attain that success until he seeks out the thing which he is most capable of doing, and concentrates all his energies on the proper performance thereof.

Colleges do not make men, they merely assist men in making themselves. After a man chooses some profession as his life work, however, he will find college training greatly beneficial in cultivating and expanding his natural abilities.

Real cotton mill men are born, not made. So it is with real engineers, financiers, soldiers, or leaders in any or all branches of human enterprise. Let us bear in mind then that a mill man, in the true sense of the word, is just as much a mill man on the day of his entrance into college as he is forty years after he receives the coveted sheep skin. The college, however, does furnish the man with an opportunity to study and cultivate his own capabilities, and to broaden his viewpoint of material things. Let it be said in passing, that the man who learns to study and to know his own peculiarities is more fortunate than the man who blindly seeks to fill his head with the contents of his text books.

Another proposition to be considered herein is the college itself. A college might be defined as a mere sign post on the road to education. Colleges do not pretend to turn out finished men who are able to step from the class room to a responsible position. In one sense, colleges may themselves be likened unto mills, in that they take raw material of various grades and endeavor to turn out a product upon which they can place their stamp of approval before releasing this product upon the market of manhood. These types of material with which the colleges have to work may be said to range all the way from "Low Ordinary" to "Middling Fair," all of which have their tinges, and other foreign matter such as leaf, trash, and neps. Just as the cotton mill endeavors to draw out a mass of matted and tangled fibers into smooth even yarn, so does the college endeavor, by systematic processes of "mental sizing and drafting" to draw out intellectual fibers into smooth and well regulated lines of thought. Much of the raw material that finds its way into the collegiate mill is gin-cut, so to speak, and not infrequently "over drafted" in the process of intellectual spinning.

Proceeding further with our analytical scheme, let us review casually, some types of men that present themselves as working stock for the coleges to deal with. As the outcome of personal observation we present the following types for consideration and comment.

First: The "don't give a darn" kind of fellow who attends college as a means of satisfying the desires of his over-ambitious parents.

Second: The studious man who is obsessed with the idea of "setting the woods on fire" as soon as he graduates from college, but who at the same time, is undecided as to the means of ignition to be used. The above two classes of men are given for the purpose of calling attention to college men in general. That is, to say, some men seem to think that a college education is a ready solvent for any or all problems that may arise in after life. These men seek merely to get college training in general; ignoring altogether the possibilities of specialization in some one vocation.

Third: The "know-it-all" chap who has had just enough work in a cotton mill to convince him that he at present is the embodiment of all necessary knowledge. This type of man seems to have as his chief ambition, the problem of convincing the instructors and everybody else, that they are all wrong unless their ideas agree with his.

Fourth: "The sweet young thing" that looks forward to his college diploma as the embodiment of all the es-

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sentials necessary for his success in the manufacturing game. Here we see that type of man that believes the absorption of a series of formulae and other theoretical ideas is the foundation of a business career.

Fifth: In cotton mill work, as well as in all other walks of life, we find that greedy, "money squeezing" individual who pictures a pile of dollars as his idea of success in life. This type of man is too "silver eyed" to be considerate of the most important phase of business enterprise—the human element connected therewith.

Sixth: In contrast with the last named type of man, let us turn the lime-light upon that man who is the embodiment of real character, and who by training and inclination is an exponent of square dealing in all things. Such a man is bound to uphold proper consideration for the needs and welfare of the human beings in his employ.

The variety of products now being turned out by textile enterprises is practically unlimited; likewise, the variation in the stock from which said products are made. Although the study of human nature has its perplexities, any person of casual intelligence is capable of distinguishing men of good traits from those of the opposite class, and to identify the qualities of each as having the proper relationship to his occupation. As the mill takes various grades of stock and endeavors to make the best possible product therefrom, so does the college take men of varying desirability and endeavor to train them for that field of industry into which those men anticipate going.

Since cotton manufacturing is the subject nearest to our hearts and minds, we will consider herein those phases of human qualifications most essential to men who contemplate making this their life work. In preparing oneself for a position in the manufacturing business, a systematic plan of honest study is very necessary. By study, I do not wish to imply that a prospective overseer, superintendent, manager, agent, or president, must continually occupy his time by "boning" over text books, notes, or other matter containing the ideas of how other men handle various problems. I do mean, however, the prospective official should make a careful study and a minute survey of his field of activity. More important still, he should have a thorough realization of his personal ability, characteristics, and qualifications.

I am sure you will agree that the human element in cotton mill work is the major problem in the management thereof, and one which the mill official should be especially capable of handling. In order to insure efficient operation it is necessary to study this problem from beginning to end, omitting no detail however small or insignificant it may seem. With this very proposition in view I suggested all the foregoing study in order to put the wheels of individual analysis into motion. In order to know and to understand others, a man must first *know and understand himself*. If a man deals with others it is obvious that others must needs deal with him. Naturally then, it behooves that man to familiarize himself with all the phases of his dealings with others; chief among said phases being none other than himself. A man's study of his own heart and general personality, under all conditions, is the most direct viewpoint for seeing and knowing his capacity with respect to knowing and handling others. Any man, be he college graduate or not, who tries to enter or to remain in the textile industry without making such a study, is nothing more nor less than sealing his own doom. Prospective manufacturers will find some mighty good food for thought in that time-old axiom which reads as follows: "First remove the beam from thine own eye that you may see more clearly to remove the mote from thy brother's eye."

L. L. Arnold, in his address to the Textile Society of Clemson College recently summed up the problem of proper preparation for a textile career in the most concise, logical, and common sense manner that the writer has had the pleasure of reading prior to that time. We heartily endorse Mr. Arnold's ideas as expressed on that occasion, and would like very much to have him express himself further, in the pages of COTTON.

After all, the many perplexities of mill management can be handled successfully by a systematic application of good common sense.

Summing up the main ideas, which I wish to sink well into the minds of the readers, I again call attention to the various types of men mentioned. It is hoped that those readers who have been interested enough to peruse these lines thus far, will try roughly to classify themselves as one of these several types of men. In so doing, let them begin a process of self-analysis that will show up the "lumpy roving" and other uneven places in their make-up, thereby enabling them to correct any faults they may find. In so doing, it is hoped that they will make themselves realize more fully the responsibility connected with all phases of human relationships in industry, thereby increasing their capacity as well as their chances for doing big things in the most interesting and fascinating business in the South.

J. M. L. (S. C.)

What is the Standard Strength for This Yarn?

EDITOR COTTON:

What is the standard breaking strength of 40s/2 mercerizing twist combed yarn? How is the standard arrived at? I am spinning 40s/2 inserting 3.70 times the square root in the ply. My yarn breaks around 125 pounds, which the mercerizer says is too low.

What do some of your readers think?

M. C. D. (N. C.)

Answering the Questions or 40s 2 Mercerizing Twist.

EDITOR COTTON:

Answering "M. C. D.," I will give the outline of some 40s/2 mercerizing twist yarn that we are now making: 40s single, 3.25 times square root of number twist, with a breaking strength of 56 pounds to 120 yards, making 40s/2 with 3.00 times the square root of number twist, with a breaking strength of 132 pounds to 120 yards.

I should hesitate to say just what the standard breaking strength should be, as 40s are made from any length cotton from 1 1/16 inch to 1 5/16 inch, and it is evident that there would be a wide difference in the strength with the different lengths of staple.

However the twist as given above is right for mercerizing to give a good luster, and with the added strength given by the mercerization, should make a very satisfactory yarn.

J. M. (N. C.)

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EDITOR COTTON:

Responding to "M. C. D. (N. C.)," I consider the breaking strength of 40s/2 mercerizing twist, combed yarn, to be approximately 140 pounds. However, there is a large margin between the yarns turned out by different mills. Some of the exceptionally good 40s/2 break 170 pounds, while poorer grades of yarn break as low as 120 pounds, but the general average of good running 40s/2 is about 140 pounds. B. C. R. (Tenn.)

EDITOR COTTON:

In reply to the questions of "M. C. D. (N. C.)," regarding the standard breaking strength of 40s/2 mercerizing twist combed yarn, I wish to advise that I have been spinning combed yarn for a number of years and I have never yet learned of any standard breaking strength for combed yarn. My experience has been that the requirements for breaking strength depends on the purpose for which the customer expects to use the yarn.

I think that when "M. C. D.'s" breaking strength on 40s/2 combed yarn is around 125 pounds that it is too low to meet the demands of the trade, but not knowing anything about the cotton he is using, or the organization of his mill, I am unable to say just where his trouble is. To meet the demands of the trade, I think his yarn should break not less than 140 pounds. D. M. (N. C.)

A man who never takes a risk never makes much of a success.

"Old Timer" Makes a Man Think.

EDITOR COTTON:

Last evening, in looking through my library where I keep back numbers of COTTON filed, I ran across the October number, and, reading along, I stopped at "Old-Timer's" page, and was very much interested in his caution to the superintendent about giving orders to his foremen. This is a very interesting and important point. Many a time, when a thing is done which turns out to be very valuable—maybe the superintendent gave the order for it, but if it develops to be of value, he wants to claim the credit for it whether he did or not. This causes an operative, who happens to be familiar with the circumstances, to have a feeling of disrespect or lack of respect for the overseer and the superintendent, while if it had been let alone, the operative would have retained his respect for both the overseer and the superintendent.

Such occurrences get things in a cross and frequently results in a loss of respect and confidence in the advantage to be gained by the change, and the effect of the good that might be accomplished thereby is lost. Things of this kind should be thrashed out between the overseer and superintendent—or better still, let the overseer have the credit, inspiring him to make more improvements and aiding him in investigations toward improvement.

The overseer is but human; he has a heart and it is easily touched. If he is working conscientiously, and his superintendent butts in unnecessarily, it is quickly taken to heart, and the inward thought comes to him, "Oh, hell, what's the use?" and his ambition relaxes and his incentive

becomes dormant. In this state of mind he lets things go by that he wouldn't otherwise pass up. And the operatives under him can see it, and the chances are that they—being human—will take advantage of it and will get an inch or two further away from the set standards, which is hard to overcome, because for every inch they slip away, means two inches to get back.

"Civility," as "Old-Timer" points out, is one big essential feature, and the complete interpretation of it could fill quite a space. It's the best lubricant in the world for the human feeling. Take yourself for instance. When you have been working for some time, fairly, squarely and on friendly terms with all you have come in contact with, and everything is going nicely—how good you do feel! That's being well lubricated. To my way of thinking, that's civility. And after all, it is only applying the Golden Rule, one of the greatest works of christianity. With this in operation there is hardly ever any friction among men, and no friction means no trouble, and no trouble means more productiveness in all lines of industry.

I once knew an overseer of weaving who, if anything was gotten up in his room, and the credit went to anyone besides himself, that person might as well begin looking for another job. On several occasions his loomfixers got up something of real assistance to quantity and quality, and when it got to the superintendent that somebody else got it up, this overseer was pitted against that fellow to the last. And he lost a lot of good men in this way. When they saw how things were working they stopped and let it go as the hours passed off for the day's pay. This overseer's progressiveness and influence came to a standstill. All the cooperation he got was by main strength and awkwardness. His men ceased to brighten him with their new ideas, and his road was hard and rough to travel, and loyalty was absent on the part of his co-workers. If he had been broadminded enough to ungrudgingly give credit to the one to whom it rightfully belonged, it would have naturally caused others to look around for something new that would add their name to the list of progressives. And even if they couldn't devise something new, the result would have been that they would have kept up their jobs that much better, and been on the lookout for defects in the work.

In my opinion, when a subordinate presents a new idea to the overseer or superintendent, he should try it out, whether he himself thinks it will work or not, and let the man see for himself and satisfy his own mind and cause him to look at the idea from another angle. The chances are he will try it again and perhaps produce some good effects from later experiments, if he is shown that his thought is appreciated. If a worker for you gets up something that you can use to good advantage, help him get it through the patent office. Where would the machine builders be if it had not been for the suggestions of inventive operatives? Not nearly up to the present plane of efficiency and standardization, at any rate. It takes all of the component parts to make the whole. No man liveth unto himself alone, "you are your brother's keeper," and in the majority of cases, an organization, and its operatives, are just what the foremen make them. They all are watching him as their leader, and if he goes about things carelessly, so will his operatives.

And they invariably conduct themselves outside of the mill according to the example set for them day by day in the mill by the foreman. Just make note of the "disorderly conducts" outside the mill, and see if most of them do not come from a certain department. Let the overseer notice this, and ask himself, if they are working for him, "Am I leading the right kind of a life before them?" It's something to think about, and the quickest we can correct these errors will be too slow. Contributor No. 14.

A Correction.

EDITOR COTTON:

In my article on page 515 of the March number of COTTON, this statement appears in the last paragraph, "Why is it that less twist is put in the yarn as the bobbin increases in size?" This should read, "Why is it that *more* twist is put in the yarn as the bobbin increases in size?" This error was a momentary one, and I regret it. It does not, however, affect the theory which I put forth in the article. Christy (Mass.)

Inserting the Twist in Yarn.

EDITOR COTTON:

The discussion in COTTON on which inserts the twist, the traveler or the spindle, is very interesting, and upon reading the latest articles in your discussion department, I decided to test this matter for myself. While a 2¾-inch ring twisting frame on 3-ply was being doffed I started up a spool without putting the yarn through the traveler at all and let it run for ten seconds. An examination of the yarn showed just what I had expected. There was twist, and lots of it, without the assistance of the traveler. This shows that you can insert twist without a traveler, but I cannot figure any way of inserting twist without a spindle.

The traveler is simply a moving guide eye on the traverse to lay the thread on the spindle bobbin. Without the traveler the thread will twist, but will not wind. A heavier traveler will allow less twist to be inserted than a light traveler, perhaps, but that is due to drag.

M. G. R. (Mass.)

Repairing a Worn Drawing Frame.

EDITOR COTTON:

I wish somebody would tell me what's wrong with one of my drawing frames. It's an old 1900 model, with metallic rolls. The flutes had become worn down so that there were ridges in the collars, arbors, or journals, that prevent the teeth from meshing too deeply and the tension on the ends had become irregular and there were uneven places in the sliver. I decided to change the rollers, so we bought a set of front rolls, consisting of the front bottom roll, and rolls for the top to match, with collars, or cuffs, as they are sometimes called—all new.

Now the point is this: Before we changed we had the tensions as good as we thought we could get them, but when we put in these new rollers the ends were so tight that we had to change the tension gears two teeth before we could get the ends to stay up and be of the right tension to make good slivers. Of course, after we had to change two teeth

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in the tension the sliver was too heavy, and we had to lighten on the weights to get it light enough.

What caused the ends to get tight? Nothing else was done to cause it, only the rollers were changed; the conditions remaining the same everywhere else. Another peculiar thing was that the tensions, before changing, were very good, but when this change was made all the ends seemed to have a more even tension than before, and were far better than with the old rollers.

Another thing: has anyone found a remedy for repairing these old rollers when they have become worn, or ridged on the collars next to the flutes so they have the appearance of being fluted? It looks like there should be some way to turn them down and re-flute them to prevent having to put the old rollers in the junk heap. T. A. D. (Ga.)

Calculating Production and Drafts for Whitin Model D-2 Combers.

EDITOR COTTON:

The instruction book issued by the manufacturers of the Model D-2 Combing Machine gives the following for calculating the production, where:

A = Delivery of coiler calender roll in yards.
B = Time run in minutes, allowing 5 per cent for cleaning and oiling.
C = Weight of sliver in grains per yard.
N = Nips per minute.
P = Production in pounds per 10 hours.
D = Draft gear of coiler connection gear.
E = Grains in one pound, 7,000 grains.

$$P = \frac{A \times B \times C}{E}$$ One

The gearing diagram shows that

$$A = \frac{N \times 60 \times 22 \times 16 \times 2 \times 3.1416}{D \times 22 \times 16 \times 36}$$ or

$$A = \frac{N \times 10.47 \times C}{D}$$ Two

Substituting this result for "A" in formula One we have

$$P = \frac{N \times 10.47 \times 570 \times C}{D \times 7{,}000}$$ or $$P = \frac{N \times 0.8525 \times C}{D}$$ Three

From this we may find $$D = \frac{N \times 0.8525 \times C}{P}$$ Four and

$$N = \frac{D \times P}{0.8525 \times C}$$ Five.

This reduces the formula to its simplest form, so anyone can figure the production or find a draft gear without going through any lengthy calculations.

Let us take as an example a comber of this model running 110 nips per minute, delivering a 57-grain sliver with a coiler connection gear or draft gear of 44 teeth and we learn that the production, according to formula Three

$$= \frac{110 \times 0.8525 \times 57}{44} = 121.32 \text{ pounds.}$$

The production may also be found by beginning at the back of the machine instead of at the delivery roll of the coiler as before. It is very evident that whatever weight of cotton is fed in at the back by the lap rolls must come through at the front minus the waste taken out.

Let us once more refer to the gearing diagram and let

P = Production in pounds for 10 hours.
B = Time run in minutes, allowing 5 per cent for oiling and etc.

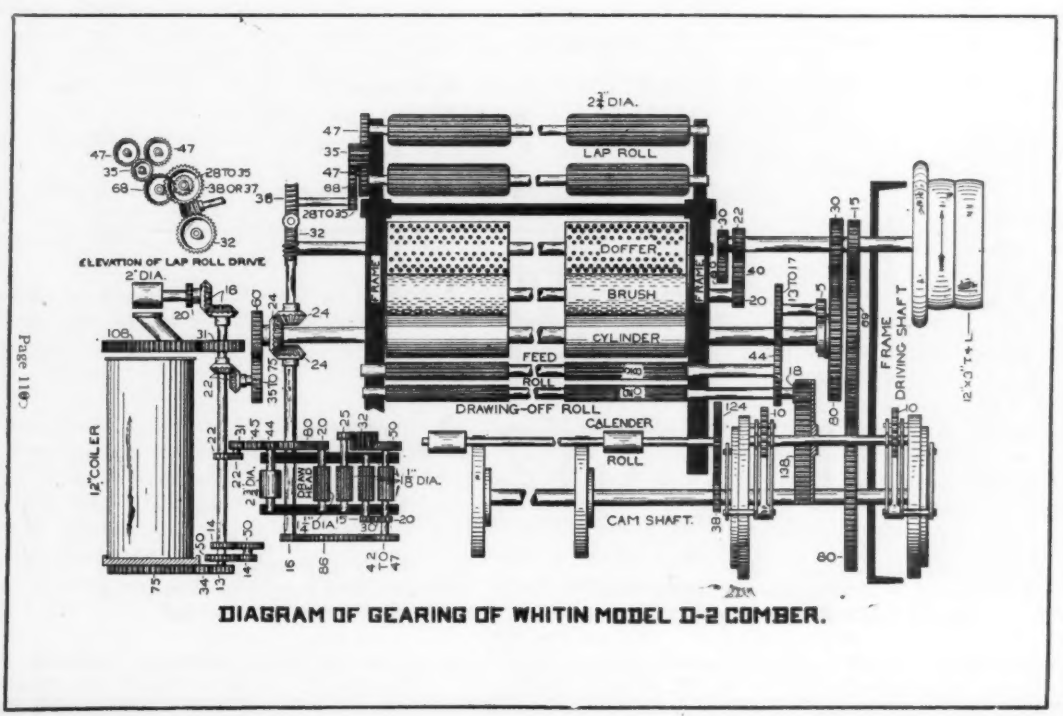

DIAGRAM OF GEARING OF WHITIN MODEL D-2 COMBER.

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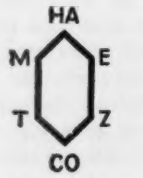

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TABLE OF TOTAL DRAFT FOR "D-2" WHITIN COMBER.
Number of Teeth in Lap Roll Change Gear "L."

Draft Gear of Coiler Connecting Gear "D."	28	29	30	31	32	33	34	35	36	37	38
35	79.52	75.03	74.22	71.82	69.58	67.47	65.49	63.62	61.85	60.15	55.96
36	77.31	74.65	72.16	69.83	67.75	65.60	63.47	61.85	60.13	59.87	54.41
37	75.23	72.63	70.21	67.05	65.82	63.82	61.95	60.18	58.81	56.93	52.94
38	73.24	70.72	68.36	66.15	64.09	62.15	60.32	58.59	56.97	55.43	53.97
39	71.73	68.90	66.61	64.46	62.13	60.55	58.77	57.09	55.51	54.01	52.59
40	69.58	67.14	64.94	62.20	60.90	59.04	57.30	55.66	54.12	52.65	51.27
41	67.89	65.55	63.36	61.32	59.40	57.60	55.91	54.31	52.80	51.38	47.77
42	66.27	63.98	61.85	59.86	57.99	56.36	54.83	53.02	51.54	50.25	46.64
43	64.74	62.49	60.41	57.73	56.63	54.92	53.30	51.78	50.34	49.08	45.55
44	63.15	60.97	59.04	57.04	55.26	53.58	52.01	50.52	49.12	47.79	44.44
45	61.76	59.63	57.74	55.78	54.04	52.40	50.86	49.41	48.04	46.74	43.46
46	60.51	58.42	56.47	54.65	52.94	51.34	49.83	48.40	47.06	45.89	42.58
47	59.20	57.20	55.27	53.49	51.82	50.24	48.77	47.38	46.06	44.82	41.67
48	58.10	56.12	54.12	52.52	50.08	49.25	47.80	46.45	45.25	43.90	42.80
49	56.80	54.95	53.01	51.40	49.80	48.30	46.85	45.45	44.30	43.20	41.90
50	55.60	53.70	51.95	50.25	48.75	47.30	45.80	44.50	43.30	42.15	41.05
51	54.55	52.60	50.94	49.25	47.75	46.30	44.95	43.65	42.45	41.30	40.25
52	53.53	51.68	49.96	48.35	46.84	45.42	44.08	42.82	41.63	40.51	39.44
53	52.51	50.70	49.01	47.43	45.95	44.55	43.24	42.01	40.84	39.74	38.69
54	51.55	49.77	48.11	46.56	45.10	43.74	42.46	41.30	40.09	39.01	37.98
55	50.61	48.85	47.23	45.7	44.28	42.94	41.67	40.48	39.36	38.29	37.29

N = Nips per minute.
W = Weight of lap in grains per yard minus waste taken out.
H = Number of heads in comber.
L = Number of teeth in lap roll change gear.
C = Weight of sliver.
T = Total draft in machine.

From this we find that

$$P = N \times \frac{24}{24} \times \frac{1}{38} \times \frac{L}{47} \times \frac{2.75 \times 3.1416 \times W \times H \times B}{36 \times 7{,}000} \text{ or}$$

$$P = N \times W \times L \times .00009 \quad \text{Six}$$

Let us take as an example a comber running 110 nips per minute, 500-grain lap, taking out 15 per cent waste with 30-tooth lap roll gear and we find according to formula Six that the production = $110 \times 425 \times 300 \times .00009$ = 126.23 pounds per 10 hours.

The total draft $T = \frac{W \times H}{C}$ and taking the foregoing example, also assuming that we wish to produce a 57-grain sliver, then $T = \frac{500 \times 8}{57}$ or T = 70.17. By referring to the table of total drafts and assuming a 30-tooth lap roll change gear, we find that the draft gear which corresponds closest to this total draft is 37 teeth.

W. G. Y. (Mass.)

An addition to the sales staff of Lestershire Spool & Manufacturing Co., Johnson City, N. Y., was recently announced. S. B. Hyde, formerly connected with the Bigelow-Hartford Carpet Co., of Thompsonville, Conn., will act as sales agent in the states of Maine, Vermont, New Hampshire, Connecticut and part of Massachusetts, for the line of vulcanized fiber and wooden spools for all classes of mills. This appointment is to facilitate Lestershire service to mill owners.

L. E. Wooten, vice-president, represents the company in the South with headquarters at Charlotte.

Figuring the Weight of a Square Yard of Fabric.

EDITOR COTTON:

In the March issue of COTTON, "Contributor No. 38" asked for information on how to figure the weight of a square yard of cord fabric with 4s warp, 34 ends per inch, 20s/1 filling, 2¾ picks per inch. "S. B. (Ga.)" and "F. A. M. (Ga.)" have answered him in the same issue, but I have a method which might be easier and shorter. Here it is:

Counts × 105 divided into twice the number of ends in the warp = weight in ounces per yard of warp.

$34 \times 36 = 1{,}224$ ends in warp.

$$\frac{1{,}224 \times 2}{4s \times 105} = 5.828 \text{ ounces of warp.}$$

Counts × 105 into width times twice the number of picks = weight of filling per yard.

$$\frac{36 \times 2.75 \times 2}{20s \times 105} = .0943 \text{ ounces of filling.}$$

5.828 + .0943 = 5.9223 ounces, weight of one square yard.

This does not allow for shrinkage and contraction, for which 10 per cent is generally allowed on warp, and six per cent on filling.

W. O. R. (Mass.)

On Making Changes in the Organization.

EDITOR COTTON:

We hear very little now of efficiency engineers, due no doubt to the fact that they failed in necessary service.

To save themselves they have created what is known as the bureau of research. I hope the change will enable them to give better service. Efficiency engineers or efficiency men have discovered with regret that most mill superintendents and overseers know more than they do, so they have switched to another tack. They now point out that the future prosperity of any cotton mill is largely dependent on the encouragement of scientific research. In other words, they come to a mill and assure us that they can eliminate

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this and that process, and save the mill thousands of dollars. Of course they fail, and instead of saving the mill a few thousand dollars, the mills are out more than they figured on saving.

I need not point out here that many mills in the northern states are in a deplorable condition, financially and otherwise. They realize that in order to save themselves they must adopt a better method of manufacture in order to produce at lower cost. I may be a critic but I always give proof to every statement I make and so I am going to cite just one case where a great mistake may be made. In a certain northern mill they have a few efficiency men that are redrafting the whole mill. They are going to eliminate all the fine speeders. They have convinced the officials of these mills that a certain mill in the state of New Hampshire has eliminated the fine frames and obtains a better yarn. In the mill in question they have in operation at the present time eight intermediates and twenty fine frames.

They will install eight more intermediate frames and throw the fine speeders into the scrap heap. The superintendent told me that the present cost on the intermediates averages about $50.00 per week, while the cost on the twenty fine speeders averages $360 per week. Therefore a saving of $360 will mean $360 $\times$ 52 = $18,720 per year. Quite a saving.

This has the earmark of the long-draft boys—for that is just what it means: long draft on the ring frames.

But, you know, these great men with letters before or after their names claim that single roving is better than double roving, and of course they know. However, they have caught the officials of the mill in question in the swirl and the mill is going to suffer. As a warning to all mill men who are contemplating a change of this character: remember that so many doublings of laps must be reduced a certain length. In other words, if you have a 12-ounce lap it must be drawn so many inches, whether it is single or double roving. When any of these experts claim otherwise, just put the following question: "If you change from double to single roving on any spinning machine, is it not a fact that you are decreasing the doubling one-half?"

We double at every opportunity so as to eliminate the defective places. Defective places will cause weakness, and this means poor spooling, warping and weaving.

You save $360 per week in the card room, and through inferior work and loss of production, you lose double that amount in the succeeding departments. I will let the readers know how the scheme works after the system is adopted.

This article, however, is a warning to manufacturers to go slow. Remember the craze of long spinning bobbins years ago and what it cost many mills? I was one of the few who fought hard with my pen against a long spinning bobbin, and as yet, have not changed my mind.

Wash (R. I.)

Joseph T. Ryerson & Son, Inc., general offices, 16th and Rockwell Streets, Chicago, have recently distributed a rather interesting pictorial story of Ryerson steel-service. It is unique in giving a birdseye view of any general steel company in its service to the trade. The sheets show views of the six Ryerson plants, factory interiors, service departments and other features of interest.

Another Suggestion on Roll Setting.

EDITOR COTTON:

In reading over the several methods of measuring distances between rolls as described in COTTON it occurred to me that a little information regarding setting the rolls might be of interest and value to your readers.

I believe that I am at present using one of the most practical methods of roll settings, and if it should prove

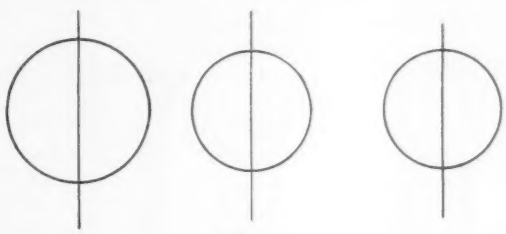


Fig. 1

of value to anyone, I would feel well repaid for my time and trouble.

First, I lay out a simple diagram as illustrated in Fig. 1. This represents the three lines of rolls on the roving frame. Then I caliper all three bottom rolls and place the diameters in the circles.

Next, I consider my rolls being closed up until they touch. Then to find the center to center distance the radii of each succeeding pair must be added together. For instance, 5/8 inch, radius of first roll, plus 1/2 inch, radius of second roll, is 1 1/8 inches, center distance, assuming the rolls are closed tight. Then the second to third rolls center to center would be 1/2 inch plus 1/2 inch is 1 inch. These dimensions I place over the diagram as shown in Fig. 2.

Next it is necessary to find the center to center distances of the rolls when they are properly set for the re-

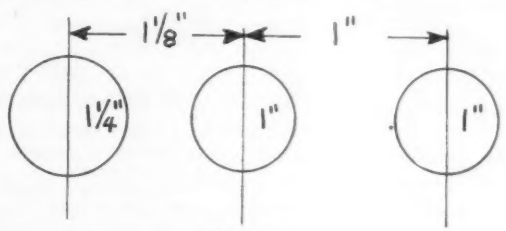
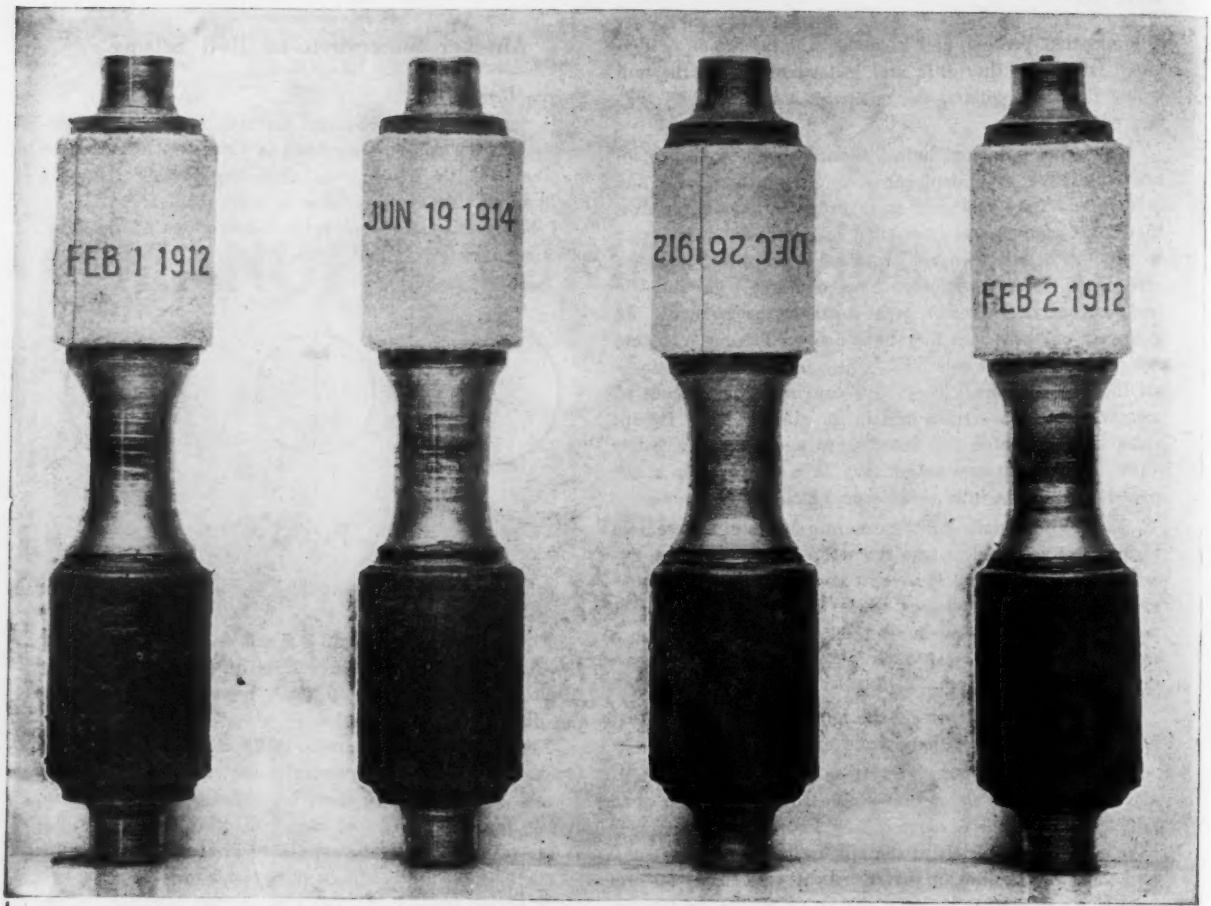


Fig. 2

quired length of staple. My rule that I have found very satisfactory is to set rolls on the roving frame 1/8 inch over the length of the staple from first to second rolls, increasing by one-eighth for each succeeding pair of rolls. Variation is sometimes necessary, of course, to meet unusual or extreme conditions, as cotton varies so greatly that hard and fast rules are out of the question.

So, assuming that 1 3/16-inch American cotton is to be run, the center-to-center distance would be, first to second rolls, 1 3/16 inches plus 1/8 inch is 1 5/16 inches. Then, second to third pairs: 1 5/16 inches plus 1/8 inch is 1 7/16 inches, the distance from center to center. These dimensions I place under the roll diagram, as in Fig. 3.

Now I subtract the upper dimensions from the lower ones and place the differences between the circles. 1 5/16 inches minus 1 1/8 inches is 3/16 inches, and 1 7/16 inches



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minus 1 inch is 7/16 inch. These last dimensions are the essential factors for this method of roll setting. I place these dimensions between the circles as shown at Fig. 4.

This diagram now contains all information in a very complete and condensed form ,and once collected it is well to preserve it for future reference. At a glance one knows

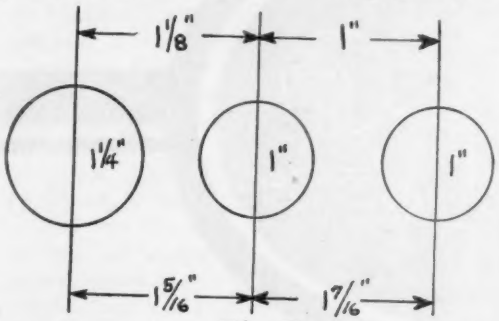


Fig. 3

the diameters of the rolls, distance from center to center, with rolls closed, and also center-to-center distance when rolls are set over length of staple properly. Also the space between the rolls which is the dimension used for setting rolls, which will be explained now.

Of course a special gauge is required for setting rolls by this method, but it is very easily and cheaply made, re-

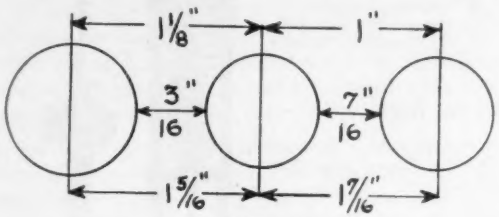


Fig. 4

quiring only a little effort and a few cents worth of brass. A very satisfactory gauge can be made from a few small pieces of sheet brass, 1/16 inch thick, of the dimensions as shown in the sketch, Fig. 5.

After making them the proper size and shape, holes

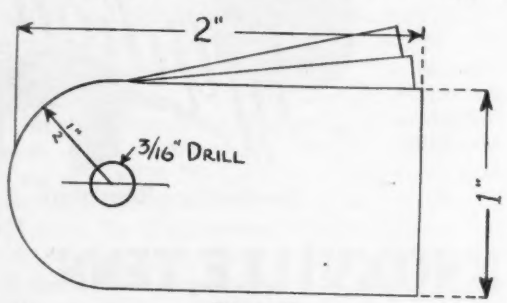


Fig. 5

should be drilled through them and a bolt slipped through them, being peened after the nut is screwed up.

In using this gauge, refer to the sketch for dimensions *between* rolls and in this case, 3/16 inch is the distance between the first and second rolls. Then three leaves of the gauge are inserted between them and the rolls tightened in place. 7/16 inch being the distance between the second and third rolls, seven leaves would be inserted and the rolls tightened. When this method is thoroughly mastered it will be found to be very rapid, convenient and accurate, as each section all along the line of rolls is set exactly the same distance, which is almost impossible by using the steel scale.

C. C. (Mass.)

An Appeal for Team Work.

EDITOR COTTON:

Should the spinning overseer ever change draft gears for the purpose of "heavying or lightening" the work? I claim that there should never be any gears changed in the spinning for the purpose of making the cloth light or heavy. Numbers should be kept always in the carding department.

There is one practice among a great many mills that I consider detrimental to all concerned. It loses money for the stockholders. It loses good reputation for the mill. It gives the spinner and weaver a bad name. It makes overseers, second hands, section men, spinners, doffers and weavers curse. It makes young men get old. It makes men with hair get baldheaded. It makes a man chew tobacco and spit amber. It puts the fighting spirit in a fellow. It finally makes a fellow quit or get run off, and causes his little children to suffer.

That one thing is this—when one of these wet rainy spells comes along and lasts for about ten or twelve days, the carder goes to work and lightens on his roving. About the time it quits raining we have all that light roving in the spinning. Then is when the trouble begins and it gives trouble until it gets through the weaving.

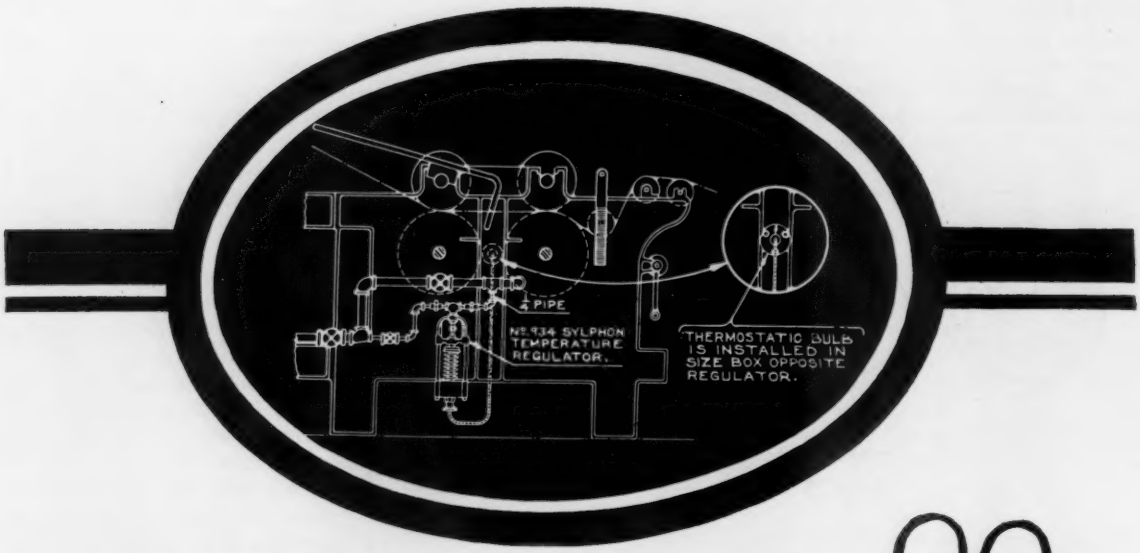
I claim if a mill's numbers are running around standard in dry weather and we have a wet spell, we should not make any change in the roving at all, because it will not take in any more water than will dry out in the cloth, and all that bad running work and all that waste and all that mad, hateful feeling that everyone has is saved, and the mill hasn't lost one cent on account of the wet weather.

Roving will always spin out from one to three numbers lighter than the sample made in the card room. The last few rounds on a roving bobbin always makes lighter warp or filling than a full bobbin of roving.

I don't believe there is a spinner in the country who can't find variation of numbers as much as one to three numbers variation on any frame in his room. When these things exist—and they do exist—a spinner has got to get on his thinking cap to know how to make these ends run with the same number of travelers on each end. A good carder can keep numbers almost correct, so nearly so that there is absolutely no need for spinning room to ever be torn up on account of light roving. But do they all do that? Not by a long shot. A carder can make enough light work in a few hours to give the spinner the jim-jams for two or three days. I am glad all carders don't do that. Some of them are just as conscientious about seeing the other fellow's job run good as about their own. A few days of wet weather with numbers running a little on the heavy side is no comparison in loss to the mill with a few weeks' running light work caused by changing gears in the carding department during wet weather.

I think every superintendent and all overseers should work for the good of the mill from all angles.

L. J. S. (S. C.)



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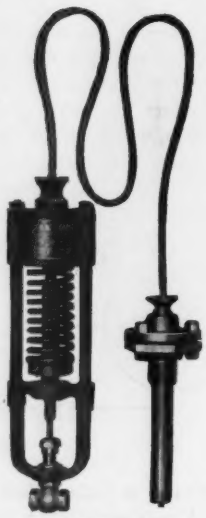

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Cards and Carding.

EDITOR COTTON:

Continuing my discussion of the card from the second letter, I will now take up the flats, their construction and operation. The flats must be so arranged that they will be supported immediately above the cylinder without coming in contact with it or without their supports interfering with its rotation. This is done by means of two arches which are strongly constructed castings resting on the frame work of the card, one on each side, and securely bolted to it. Each arch carries five brackets which are composed of several pieces. One portion of each bracket projects upward sufficiently to carry a pulley that serves as a support for those flats that are not performing any carding action and that are passing backwards over the cylinder while another portion of each bracket serves as a support for the flexible bend and provides a ready means of adjusting it in order to move the wire teeth of the flats that are at work nearer to or farther from the wire teeth on the surface of the cylinder.

A fuller description of the arrangements for adjusting the flexible bends will be given in the description of setting cards. It is sufficient to state here that the flexible bends can be moved farther from or nearer to the cyinder shaft at any one of the five setting points on either side of the card, and by this means the upper edges of the bends can be adjusted so as to be practically concentric with the circumference or wire surface of the cylinder. About 40 of the flats rest on the flexible bend at each side of the card. The portions that are in contact with the bends are two surfaces known as the toe and the heel.

The chains are placed as near the flexible bends as possible since if they are too far away the pull and weight of the chains cause a deflection in the flat. It is absolutely necessary that the chains on each side shall be exactly alike and work with the same tension, as the smallest variation will pull the flats out of their proper positions over the cylinder and their accuracy will thus be destroyed. Chains are now so made that the whole variation from the standard is not more than 1/50 of an inch.

The flats are, of course, linked together on each side of the card by an exactly similar arrangement except that as has been previously stated, left-hand screws are used on one side and right-hand screws on the other. The flats, when at work, are resting on the flexible bend and held so that the points of the wire on their surfaces are almost touching the points of wire on the cylinder. The exact distance between the wire on the flats and that on the cylinder is adjustable and is usually about 7/1000 of an inch. The distance between the wire, however, is not the same at each point in the width of the flat. The wire of the flat at the heel is closer to the cylinder than at the toe, the distance being about 3/1000 of an inch, thus making a wedge shaped space between the wire of the flats and the wire of the cylinder.

The flats are always constructed with this heel and toe formation and it should be preserved throughout the life of the card. The chain of flats is not stationary, but moves at a very slow speed, those flats nearest the cylinder moving towards the front of the card while, of course, the flats that are not working are carried backwards over the top of those that are working. The means of imparting motion to the flats which will be described in connection with the gearing of the card results in a steady smooth movement usually at the rate of about three inches per minute, although this may be changed to either a faster or a slower speed according to whether it is desired to remove more or less waste respectively from the cottom. The object of giving a movement to the flats is to carry toward the front of the card those flats that have become filled with impurities so that they may be stripped and brushed out before they become too full of leaf and other foreign matter to perform the duty of carding the cotton.

The flats that are not at work are supported at the front by two pulleys, one at each end of a shaft that has its bearings in two brackets, one on each side of the card. On the same shaft with these two pulleys are two sprocket gears, the teeth of which mesh with the ribs of the back of the flats, and as this shaft is driven by means of worms and worm gears, the sprocket gears drive the flats. The portion of the chain of flats directly above the cylinder and resting on the flexible bend revolves in the same direction as the cylinder, namely, toward the front. The flats that are not at work move backwards in the opposite direction to the cylinder and rest on pulleys supported by the brackets attached to the arch of the card and duplicated on each side.

The ends of the flats rest on these pulleys and impart motion to them by frictional contact. Two of these pulleys at about the center of the card are connected by a shaft that extends across the card. The pulleys which are directly over the licker-in form the turning point of the flats. Those that have been cleaned and carried along over the top turn and pass over the cylinder to perform their work, become charged with impurities, pass around the pulleys at the front and are again cleaned. The bracket which supports the pulley is so constructed that the pulley may be raised or lowered to take out the sag or slack in the chain of flats or to allow sufficient slack for the flats to revolve freely.

As previously explained, the cotton is transferred to the face of the cylinder from the licker-in at the point where the two surfaces nearly touch each other, and is carried upward and forward by it until it is brought to the point where the flats and cylinder are brought into close proximity. When the cylinder reaches the first flats the cotton on its surface has a tendency to project from it on account of the centrifugal force of the cylinder, and comes in contact with the teeth at the toe of the first flat, receiving more and more of a combing or carding action until the heel of the flat is reached, where the teeth of the flat and the cylinder are in the closest proximity and where the cotton consequently receives the greatest carding action. Some of the fibers that have not projected sufficiently may not have received any carding action and the cylinder carries them forward to the next flat. Those fibers that have been carded once may be carded again with such additional fibers as are brought under the action of the succeeding flat and so on throughout the entire series. The flats are set a little closer to the cylinder by some mill men at the front or delivery end than at the back or feed end of the card, and this method, combined with heel and toe arrangement of the flats, insures a gradual and effective carding of all the fibers before they have passed under the last flat.

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The small impurities are left behind, since they are forced between the teeth of the wire on the flats or cylinder and remain there until the wire is cleaned or stripped as will be explained later. Thus the short fibers and impurities are retained while the long clean fibers are passed forward.

The flat stripping comb at the front of the card is a comb supported by two arms. This comb consists of a thin sheet of steel attached to a shaft and having its lower edge made up of fine teeth. It is capable of adjustment so as to be moved closer to or farther from the wire on the flats. The comb is given an oscillating motion by means of a cam action on the arm and at each stroke strips from a flat a portion of the short fibers, leaf and other impurities that adhere to its face. With this arrangement a close setting between the comb and the flats is not possible, owing to the difficulty in giving a backward movement to the comb without damaging the clothing of the flats. There is also another method for flat combing—a comb with bearing and actuating levers. This comb has two motions, namely, an oscillating motion, which it receives through the arm from the cam by letting the arm swing around the point as a fulcrum, and a turning motion in its bearing received through the lever from the cam. The teeth of the flats are stripped while they are pointing downward by a downward stroke of the comb, governed by the cam. As the comb lifts it is traveling in a direction opposite to that in which the teeth are pointing, and to prevent injury to the wire, the comb is turned away from the flats by means of the cam. By the use of this arrangement a closer stripping action is obtained without damaging the wire.

In a subsequent letter I will carry on this discussion on carding to a further development.

Bab (N. C.)

Answers on High Twist Yarn.

EDITOR COTTON:

In answer to "Contributor No. 13," who asked in the March number as to the advisability of making 30s carded yarn out of 1 1/16-inch cotton, the yarn to contain 45 turns of twist per inch, I will say that, owing to the excessive twist he intends to apply, he should use the best cotton he can get. While it is apparent to most people that the shorter staple cotton needs more twist than a longer staple cotton needs to get the same breaking strength, in this case of an extra hard twisted yarn it is easier to get results with a long staple than with a shorter staple cotton.

I must assume the inquirer intends to make this yarn for some fancy effect or some other special purpose; therefore, the shorter the staple the more shady will be the resultant yarn because there will be more or less uneven places, and the uneven places will contain unequal amounts of twist.

The thin places will have the greatest amount of twist and this will so weaken the yarn at these points that the ends will break excessively. A better garde of cotton will assure him of easier handling, higher production and a better resultant yarn.

Regarding the breaking strength, I do not think this can be answered definitely. If he is looking for breaking strength he will have to come down on the twist, because the square root of 30s is 5.47, and 5.47 divided into 45 turns gives a twist multiplier of 8.23. In applying this twist he has long passed the limit of the strongest point, and the breaking strength will be much less with this standard than with the accepted standard of 4.75. His best efforts will have to be applied to find the correct spindle speed to use and to run this successfully he must come down on his spindle speed from the regular speed generally used for 30s yarn.

My experience has been that the better grade of cotton I used I could run at a higher spindle speed, giving me a higher production and thus helping to reduce the cost of the higher priced cotton.

The contraction in this yarn will be so great that he will have to use a draft gear three or four teeth smaller than the calculated draft gear.

He should use filling wind if possible and carry excessive humidity to aid good spinning.

I hope I have helped the inquirer in answering these questions, and wish him success in his endeavor.

Christy (Mass.)

The Tension Constant.

EDITOR COTTON:

Just the other day, the question of tension constant for speeders was brought up by one of my friends as to why the square root of the hank number is used here instead of the number itself. He can see that there is a similarity in this to the twist angle proposition which was fully treated in articles which recently appeared in COTTON. But he failed to work from the one into the other. I am sure that my friend is not the only one who couldn't do that. So, I think, a deduction of the tension constant might prove interesting to the readers, hence this letter.

Before I actually go into the deduction of the tension constant, I would like to make a few remarks about the deduction of formulas in general. Like everything else, there is a limit to the mathematically deduced formulas . . . or, experimental formulas, for that matter. In order that we can use it to the best advantage, we must be able to locate this limit beyond which our result will be seriously in error. But it is not at all hard to locate this limit, if all the composing factors are known. For, the error of the result comes from the error of the different components. In deducing the formula, certain conditions are assumed. But these conditions are ideal conditions and generally can not be fulfilled. Hence, our practical conditions are in error when compared with the ideal conditions. This causes our result to be in error. If we know the limit of it, we can still make use of the formula to solve the various problems without getting us into serious trouble. Knowing this we will go on with our deduction of the formula for the tension constant, which is very easy, as the readers will see.

To begin with, let us see what is the twist constant for speeders which we are now using. We find the turns per inch that goes into the roving by dividing the spindle speed (r.p.m.) by the front roll surface speed (inches per minute). This is quite evident. Now, if we omit the twist gear in this calculation, we get the twist constant. When we have certain turns per inch and want to find the twist gear, all that we have to do is to divide the twist constant by the turns per inch that we want to put into the

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roving. The result will be the gear to use. But the turns-per-inch is composed of two factors, namely, the twist multiplier, and the square root of the hank roving. Now the twist constant is a constant and the twist multiplier is also a constant. We know that a constant divided by a constant is still a constant. To illustrate my point, 6 is a constant, and so is 2. If we divide 6 by 2, we will always get 3. It couldn't be otherwise. This reduces our formula of finding the twist gear to dividing the new constant by the square root of the hank roving. The new constant is nothing more or less than the product of the square root of the hank and the twist gear used. If we change from one hank to another and want to find the twist gear, we just divide the new constant by the square root of the hank (supposing the same twist multiplier is being used in both cases). Now, we know that the gears are all inter-related. As the twist gear is inversely proportional to the square root of the hank roving, as just proved, so must be the tension gear. In a similar manner, we can find the tension constant by multiplying the square root of the hank number by the tension gear used, just as we do in the case of twist constant. And we know the reason for it. This answers our question as to why the square root is used instead of the hank number.

But, as stated before, there is a limit to this. What is our limit here? To answer this, let us see what are the composing factors. The machine itself, the cotton used, the hank number being made and the twist multiplier are the factors that enter our equation. We know that all of these vary a great deal. But just to what extent is controlled by local conditions. The man in charge can easily figure out just to what extent his factors are in error and make the corresponding correction. And remember that generally the deduced formula, which we are now using, gives a fairly good approximation as to what gear to use. Usually the error can be corrected by changing a tooth or two of the tension gear.

I might as well go a step further and state in a few words as to how the tension constant should be found from experiment. Suppose we have a new machine and want to find out what the tension constant is. We would make a test on it by making any hank roving. Watch the tension of the roving when the machine is started. If it is too slack or too tight, change the cone gear to correct this. It is a good practice to run it just a little slack first and change back a tooth, because it is rather hard to tell on the tight side just how much tighter it is than it should be. But it is a very easy matter to tell from the slack side. After running a while, supposing it is corrected in the start as described, we may find that the roving is either too slack or too tight. Now change the tension gear to make the correction. After making all the necessary corrections, we should satisfy ourselves by making another test. If this proves to be satisfactory all the way through we can multiply the square root of the hank roving being made by the tension gear used. This is our tension constant. It should be remembered that it is true only for certain conditions. If the conditions are changed, the constant is changed also. So if we change from one cotton to another, or the twist multiplier is changed, or any other condition is changed, a new constant should be found.

H. H. Y. (Mass.)

Factors in Efficient Weavng.

(*Continued from page* 689.)

are always very much more favorable than early in the morning when yarn breakages are frequent. Thus, in the afternoon, maximum efficiency is very quickly reached but the effect of fatigue soon becomes noticeable and to this must be added, during the winter months, the loss in efficiency which follows the use of artificial light. The low efficiency noticeable on Monday morning is partly due to the operative losing her swing during the week-end, partly to the machinery not working quite smoothly after lying idle and partly to the yarn being less humid and colder than on other mornings of the week. After a longer holiday maximum efficiency is still slower in being attained, in fact, the longer the interval between working times, the greater the temporary loss of efficiency.

Considering incentives to efficiency it is generally agreed that piece-rate payment is much more satisfactory than payment by time. As all the operatives were paid by piece there was no variation resulting from different methods of payment but there is one point which is interesting. When, at the end of the week, the number of "cuts" turned out by the weaver is recorded for the purpose of calculating her wages, any "cut" uncompleted on the loom is carried forward to the next week. It is found that the approach of the "booking-up" period, as they call it, stimulates the weaver to endeavor to increase her output and her efficiency tends to increase some time before the record is made. Immediately afterwards there is always a considerable relaxation of effort. Holidays are also another incentive which exercises considerable influence on output. It is the custom in the cotton industry for all the factories to close for one week in the summer and the operatives are found to make the greatest effort in the second week before. Money is freely spent during the summer holiday and greater effort is made to earn it. It appears, therefore, that all the operatives have a reserve store of energy which allows them to spurt when they have a special incentive. Under normal conditions it is apparent that they prefer a slower speed of work, which perhaps is just as well because they might break down if they endeavored to work at high pressure for an extended period. Another incentive is short time, which is, alas, too prevalent in the British cotton industry these days, but it is not an incentive to increased but to decreased efficiency. In one shed under observation where short time was worked for a considerable period the average hourly output was 6 per cent less than when full time was being worked. This result appears to be due to a change in the attitude of the weavers towards their work. It is probably partly due to the disturbing effects of short time, which interferes with their usual routine, and partly to an appreciation of the fact that there is a limited amount of work available and that it is best to decrease output for fear greater partial, or total, unemployment may occur. The spectre of unemployment has always a very unsettling effect on the operatives and invariably results in a loss of efficiency.

From the observations made regarding fatigue it appeared that in one shed the working capacity of the weaver on Thursday afternoon was 7.3 per cent less than it had been on the preceding Tuesday morning, conditions regarding temperature and humidity being similar. General-

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ly it is found that the time required to attend to loom stoppages is longer in the afternoon than in the morning and that this increases as the week goes on until by Friday it averages 7.5 per cent greater than it would have been on Tuesday morning given similar atmospheric conditions in the shed. This result appears to demonstrate that fatigue has a cumulative effect during the week and also that in the morning the fatigue engendered by the previous day's work had not been completely shaken off. To account for the slowness on Monday morning we must return to the previously noted condition of the loss of swing on the part of the operatives.

In the case of hourly variations in efficiency during the day the investigator assumed that the capacity of the operatives was at its maximum height during 8:15 a. m. and 10:15 a. m. He then worked out the percentage decreases in output and found that by far the greatest (12.7 per cent) lay in the closing hour of work, i. e., from 4:30 p. m. to 5:30 p. m. The results arrived at were quite independent of any variations in atmospheric conditions and include no other factor but the decreased working capacity due to the onset of fatigue. The figures collected show that the dinner-time break is sufficient to dispel entirely the fatigue produced during the morning spell of work but they also show that fatigue sets in much earlier and becomes greater in the afternoon. In arriving at the hourly variations in capacity during the week it was assumed that the operatives were most efficient during the period from 8:15 a. m. to 10:15 a. m. on Tuesday. Comparing the morning spells, the biggest decrease in efficiency occurred on Friday, the percentage being 2.6. In the afternoon spells the biggest decrease was also on Friday with a percentage of 7.5. On Monday morning the decrease was greater than through Tuesday morning, but in the afternoons of these two days Tuesday showed a greater decrease than Monday.

Some general deductions regarding fatigue are also of interest. The figures show that the operative becomes fatigued a little earlier on each successive morning of the week and that the fatigue is cumulative. The efficiency curves obtained show that fatigue is more rapid in its onset and greater in summer than in winter. The increase in temperature is favorable to the yarn and less time is lost repairing breakages but the ability of the weaver to repair the breakages that do occur is lessened. Thus the advantage obtained by the high temperature is more than counterbalanced by the loss of efficiency.

Turning to the physical factors and considering yarn variations it appears that variations in the warp breakages are very considerable. It is not possible to trace any regular relationship between the number of warp breakages and temperature or humidity. By this is meant that there is no regular decrease in the number of breakages as the temperature or humidity increases. Differences in the strength of the yarn appear to play their part just as much as atmospheric conditions. It would appear that greater attention should be given to the quality of the yarn, and its treatment in preceding operations, in order to increase efficiency as regards this factor.

A high loom speed does not in itself imply a big output, because looms working at a comparatively slow speed may yet give great efficiency. If the speed is increased beyond a certain point there will be many warp breakages, thus the looms are usually run at a speed known to give the best output for the class of cloth being woven. The management have to make sure that this speed is maintained, but, nevertheless, the investigation demonstrated that there are considerable variations existing. For instance, in one shed where the average speed was 194 picks per minute, the highest and lowest speeds observed were 198 and 184, all the looms being employed on the same class of cloth. The lower speed thus gives a percentage decrease in output of nearly 5. It is certain that in a well-managed shed the decrease in output arising from such a cause should not be allowed.

In a general recapitulation the investigator makes some practical suggestions based on the results obtained. The efficiency in humid sheds increases as the temperature and humidity increase up to a certain point, this point being when the dry bulb temperature is 80 and the wet bulb 75, and from the statistics collected it appears that the best all-round temperature figure is from 70 to 75 with a relative humidity of 80 to 85 per cent. As, however, there would be fewer yarn breakages if the temperature and humidity could be increased—and this is not possible without a detrimental effect on the weaver—it would appear an advantage to have a normal atmosphere throughout the shed and a hot humid atmosphere around each warp. Experiments aiming at local humidification of looms have been made but with unsatisfactory results; still, if very high temperatures and humidity are necessary in the weaving of certain kinds of cloth, some system of local humidification must be evolved. If, however, the industry is content with lower temperatures the problem narrows down to how best to keep the summer reading below a reasonable figure or to otherwise reduce its injurious effect on the weavers. There is now an apparatus on the market which maintains a dry bulb temperature of just over 72 with an 80 per cent humidity throughout the hottest weather, and this appears to solve the problem. Air movements confined to the vicinity of the weaver would also be helpful, being better than general circulation of air through the shed. The conditions which best suit the yarn are those which are most unsuitable for the weaver, and, therefore, special measures regarding temperature have to be taken during the hot summer weather. Another suggestion is that experiments should be carried out with a view to discovering some new method for the treatment of the yarn, some method which would allow of its being woven without the present necessity for humidity. Research on such lines would be most valuable, because if humidity became unnecessary in weaving the operatives would enjoy better health and show increased efficiency. There are no records of sickness and mortality available for cotton weavers alone, which is unfortunate because well-compiled sickness returns would certainly convince those few employers who still consider that excessive humidity has no bad effect on the operatives and does not reduce efficiency. There is a great respect for tradition in the Lancashire cotton industry and many of the employers seem to act on the principle that what was good enough for their fathers and grandfathers is good enough for them. Few of the factories have special statistical departments, and efficiency records compiled by individual firms are almost non-existent. Consequently they have no means of ascertaining the relations of cause and effect in their bearing on efficiency.

Individual differences in weaving efficiency are chiefly

caused by innate differences in the capacities required in the process. Where an operative may be deficient in one or more of the capacities, the investigator points out that she finds the work more difficult and fatiguing than other weavers do and is apt to worry about her disabilities. She might probably, therefore, be employed more efficiently in another department of the mill. We, therefore, come back to the great importance which vocational tests would play in selecting young girls for training. Unfortunately the value of such tests is not generally appreciated in the industry at present. The question of training budding weavers scientifically is also one to which attention should be paid. An analysis of the methods of the most efficient workers should be made and a system of training based thereon which would avoid as far as possible the formation of unsuitable, uneconomical and fatiguing habits of work. The best speed for looms weaving a certain kind of cloth and the determination of the most suitable number of looms per weaver are questions which deserve further investigation. There is great variation in the latter case. One weaver can control as many as 24 Northrop looms, but with Lancashire looms the number varies from two to six. Given uniform conditions of work it would seem best that individual differences in weaving ability should govern the number of looms supervised.

Slack Yarn on Warpers and Slashers.

EDITOR COTTON:

I read with interest "T. A. D.'s" letter in the March issue on slack yarn at warpers and slashers, and agree with him on quite a few things, but I don't seem to understand about his yarn passing over the measuring roll and not registering. He says the thread will slide over the measuring roll and will not be measured. I take it that the measuring roll must be stopped. If it is not stopped it must be measuring. Another thing, he says the measuring roll gets worn and does not measure correctly. He must have some very old warpers if the rolls are worn to that extent. I suggest that he get new rolls or have the old ones fixed so they will work right.

As to the spools running slack, why not have different kinds of skewers for different kinds of spools, iron or wood, and if he can't get enough tension with round skewers, I suggest that he try skewers cut flat on each end. This will keep any spool tight. I fail to see why he can't remedy these slack ends.

Another thing in his article is the covering of the measuring roll. I have worked in quite a few mills in New England, and have run from 20s to 80s, and we never had any trouble with slack ends at the slasher. In my opinion he is having his trouble with his spools, not his measuring roll. The ends must not run so very slack or they would cause the drop wires to fall and stop the warper. I have never come across this trouble in slack ends and I have run some fine yarn.

As for the waste at the slasher, I must say "T. A. D." is doing exceedingly good with six-tenths of a pound.

I don't want "T. A. D." to take this as a knock, as we are here to learn something and I think this "How Other Men Manage" department is a good thing for us all.

Fitchburg (Mass.)

Draft Suggestions for "J. D."

EDITOR COTTON:

Regarding the communication of "J. D.," while not going into detail, I shall try to offer some suggestions on drafting in a general way that might help him, and also be of service to other readers. (If he would care to give me a complete layout of one or two of his special problems, in a future issue, I shall be very glad to go through them with him in a very detailed manner, and perhaps shall be able to help him very materially.)

One of the greatest faults in drafting is the temptation to go to extremes. For instance, the carder might be using a comparatively short draft on one or two processes, and on the next following process will jump his draft considerably in an effort to compensate for his short drafts in the preceding machines. That is a very bad practice because short drafts tend to produce cockled yarn or roving, and overdrawing will greatly weaken the stock and tend to produce an uneven yarn having a poor breaking strength. It is good policy to try to run with the draft distributed as evenly as possible between the several machines, and to keep within a certain conservative limit.

Below I am listing what in my opinion is a table of good average drafts for general all around work.

Breaker picker	1.5-2
Intermediate picker	3 -5
Finisher picker	3 -5
Cards	80 -120
Drawing frames, doubling 6	6
Drawing frames, doubling 8	6 -8
Sliver lap machines	1.5-3
Ribbon lapper, doubling 4	4 15
Ribbon lapper, doubling 6	6 17
Comber (old style)	20 -30
Comber (new style)	40 -60
Slubber	3 -5
First intermediate	4 -6
Second intermediate	5 -7
Jack frame	6 -8
Ring frame (single roving)	7 9
Ring frame (double roving)	8 -10

Of course these drafts are not essentially arbitrary, but if a great deal of variation from this range is used, there is apt to be trouble with the work.

As a rule, I try to keep within this range, preferably close to the middle draft if possible, but if absolutely necessary, I exceed them of course, but try to split any increase or decrease of draft between at least two machines.

If "J. D." does not get a satisfactory answer from any of the various contributors, I shall be glad to help him further, as before stated, but to take all his problems as outlined in the February issue, and follow them through in detail, would take several pages of valuable space to explain them minutely. And I think that if he presents one or two of his problems for a complete analysis, he will be able to modify them to suit his other conditions.

C. C. (Mass.)

Did you read "With the Publishers" on page 657 of this number? The mill man's comments on that page may present some old thoughts to you in an entirely new light. Turn to it now and read it.

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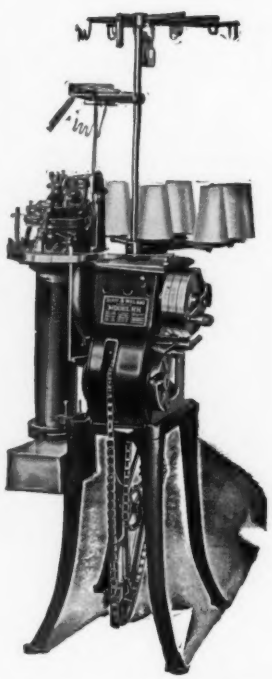

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The cotton mill operatives of New Bedford are the highest paid, happiest cotton mill people in the country. The fine living conditions, excellent working conditions and short hours, good schools for the children, and all the advantages of a healthy city attracts the finest kind of people to the mills of this city.

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Unmistakably reflecting an effective and active organization, the annual convention of the National Association of Hosiery and Underwear Manufacturers this year was another credit to the officers, and resulted in much of benefit and pleasure to the members. The convention was held at the Bellevue-Stratford Hotel, Philadelphia, on Wednesday and Thursday, April 9th and 10th, which was during the week of the annual Knitting Arts Exhibition of the Association, that was conducted during the week of April 7th to 11th inclusive.

Joseph H. Zens, general manager of the United Hosiery Mills Company, Chattanooga, Tenn., as president of the Association, was the presiding officer at the convention sessions and luncheon, and maintained his usual efficient standard in this position. He was re-elected to the chief executive position in the Association at this year's meeting—a merited recognition of his efficient and valuable service in that office during the past two years.

The first session of the convention was brought to order by President Zens on Wednesday morning. Contrary to usual form, Mr. Zens presented no prepared report as president, but spoke extemporaneously, outlining some of the activities of the Association and presenting some of its accomplishments during the past year.

At the outset of his remarks, Mr. Zens referred to some criticism of the change of meeting place from the exhibition hall to a downtown hotel, to which he replied that it was necessary that the Association and its meetings be successful in order that the exhibit, which it fosters and which depends upon it for its own success, might also prosper; and that the holding of the convention at the hotel was found to be most satisfactory in every respect.

Submitting a brief financial report of the organization, Mr. Zens showed that the Association, while it had made some extraordinary expenditures, had closed the fiscal year in better financial condition than had obtained for some time.

In taking up some of the Association's activities, Mr. Zens announced that among the more important was the research laboratory, which, he said, is handling on an average of sixty problems a month. He called attention to the interesting exhibit of this department at the exposition. He pointed out that this department had saved those members who had availed themselves of its service a great deal of money, "and it is our hope," he continued, "that more of our members will take advantage of the laboratory's service."

"Our collection department has grown by leaps and bounds," he continued. "We found that the collection department was becoming expensive, and the directors decided that they would put a small charge on the demand letters after the first and second letters, these being sent out gratis. This charge was put on a month ago, and it has not affected our service, as the demand on the collection department has increased, as many of our members fully realize that the Association is entitled to some return on the money they were putting in on the collection department.

"In connection with this I want to state that we do not want the members to get the idea that we are charging them for any service. I believe we are today giving our members more for their money than any association of this kind. The officers are looking constantly for new ideas and will be only too happy to serve the members. Since the offices were moved to New York the demand for service has increased manifold. Calls at the office are greater in number. Our secretary is at all times ready to serve each and every one of you; all information gathered at the office is absolutely confidential."

Proceeding, Mr. Zens stated that the subject of artificial silk is something every knitter is becoming more interested in, and in view of this fact, the program committee had secured Bertrand R. Clarke, vice-president of the Tubize Artificial Silk Company of America, to discuss

JOSEPH H. ZENS, PRESIDENT.

The Field of Artificial Silk in Hosiery and Underwear.

Mr. Clarke spoke in a very interesting and instructive manner, saying in part:

"Just a month ago, some of our newspapers announced the death in Rome of Count Hilaire de Chardonnet, inventor of artificial silk. With no greater tribute than that, did the majority of our press dismiss the passing of the scientist who contributed the greatest and most important textile discovery in thousands of years. He gave to the world its first new and commercially practical yarn since the beginning of historical records. He saw it develop in his own lifetime to an industry representing each year an expenditure of millions on millions of dollars. Today, his creation gives employment directly and indirectly to countless thousands of men, women and children, and his

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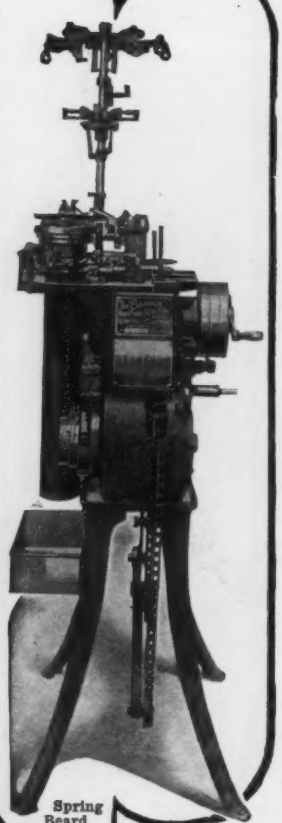

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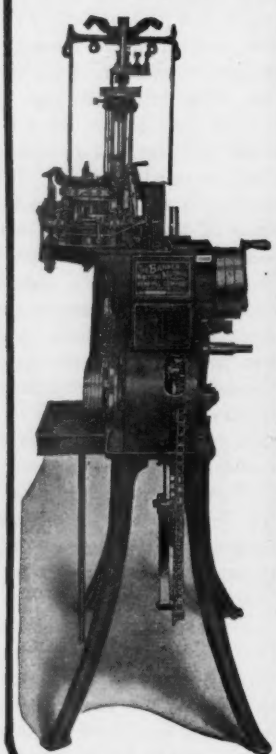

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product, in some form or other, is in the household of almost every family in the civilized world. It has earned for itself not only a distinct place of its own in the field of textile endeavor, but every day is branching out and creating new outlets and new uses, as a monument to the achievement of science. Is it not an inspiring thought to realize that one single individual can do so much for the comfort and advancement of his fellow men?

"From the standpoint of unusual achievement, it would seem that the most outstanding feature of this great discovery lies in the fact that the original process has remained and the base of his material, cotton, is still regarded as the best of all. True, there have been many mechanical developments and labor saving devices, which improve the uniformity of the product and reduce its manufacturing cost; there have been slight changes in chemical compounds which increase the strength of the yarn; other processes and other methods of reproducing his discovery have grown up, expanded, and flourished, but the strongest, most versatile, and best of artificial silks still continue to follow in his footsteps. Today, some of the largest manufacturers of the country who produce from other basic materials, such as wood fiber, have announced their intention of reverting to cotton.

A century or more ago, scientists of the time began to interest themselves in the production of real silk artificially. To this end, various men went to China and Japan, spending years in the study of the silk worm, its habits and life. They endeavored to analyze the silk fiber and to reproduce it by mechanical means. Experiments along this line continued until Count Chardonnet decided that nature could not be exactly duplicated by mechanical means. He, therefore, determined to create an entirely different product using the cellular structure of plant life as his base, and the appearance of real silk as his ultimate goal, but traveling toward his destination along a different route. On the theory that vegetable fibers were next in strength to the strands of real silk, he endeavored to unite fiber with fiber to form a continuous, unbroken filament.

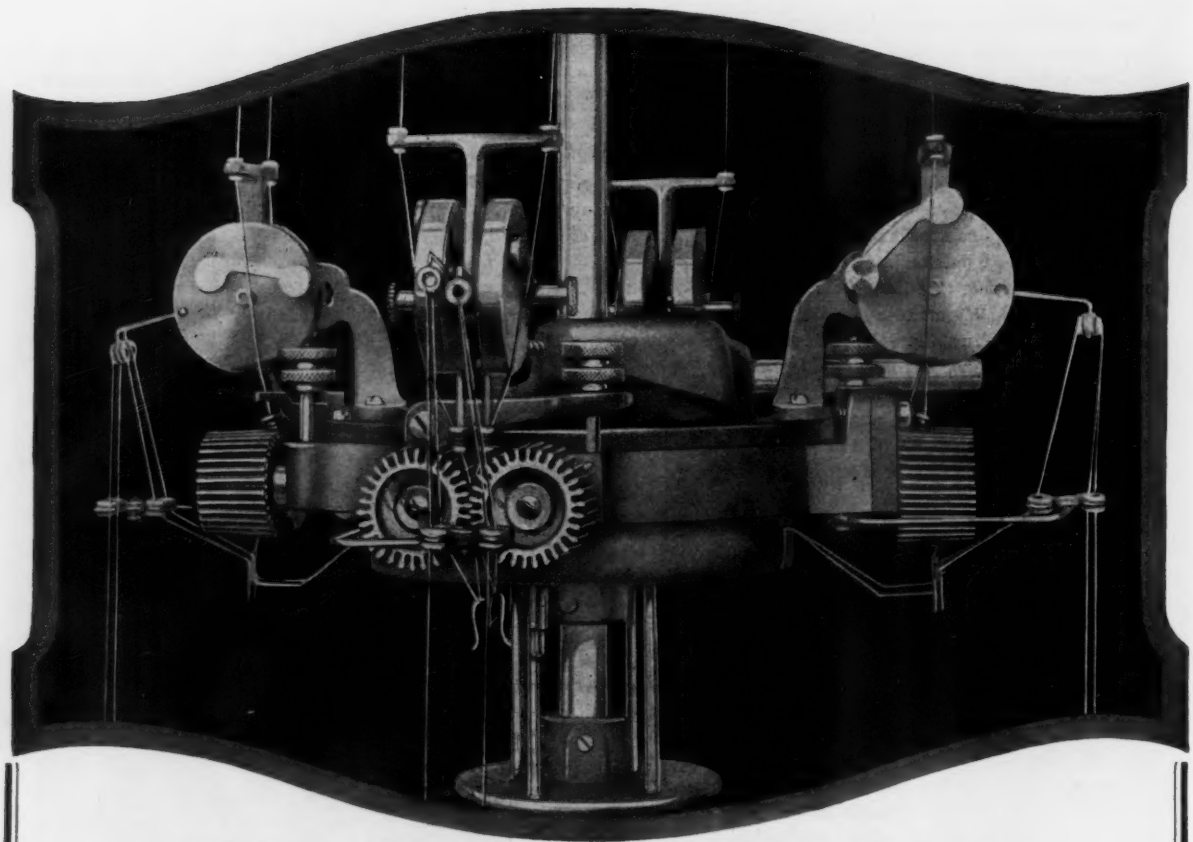
To do so, his problem was to discover the proper method of changing the chemical state of the vegetable fiber so as to render such a condition possible. Starting with cellulose, the original structure of all plant life, his discovery lay in a method of treating such vegetable fiber so that it could be dissolved or held in suspension in liquid form and later solidified in a continuous thread or filament. Various forms of plant cells were tried out, and the first yarn produced came from the mulberry leaf. Later, however, cotton, being cellulose in its purest form and most easily obtainable, was decided upon as the basic material. From the erection of the first plant in 1891 to this day, what is known as the Chardonnet process continues to use cotton as its base and continues to be known as the strongest and best of all of the artificial silks. This is the process, of course much improved with new inventions and new methods, now used in all the Tubize plants and in numerous others throughout Europe. All processes are more or less shrouded in mystery but the basic principles are similar, and, as I am more familiar with our own processes than that of other methods, I will describe them to you in brief:

"Bleached cotton is first nitrated by means of sulphuric and nitric acids, great care being used to secure an even and consistent degree of chemical action. The resultant mass, which is actually guncotton, is then dissolved in a mixture containing as its chief elements alcohol and ether, which produces a heavy viscous collodion, not unlike vaseline in appearance and of the consistency of cold molasses. This liquid is then forced through minute apertures set in the main supply pipe of a spinning machine. As the liquid emerges, each strand or filament is caught on a rapidly revolving bobbin located above the jets. Before reaching the bobbin, however, the alcohol and ether have evaporated, leaving the cobweb-like filament in quite a dry, firm state. The filaments are then transferred to a twisting machine in groups, and twisted together with approximately two and one-half turns to the inch. From the twisting machines, the thread is passed to reelers where its length is exactly determined and the thread wound into skein form by the method known as Grant reeling. The skein is laced through before removal from the reeling frame.

After lacing, the artificial silk, which remains up to this

JOHN NASH MCCULLAUGH, NATIONAL SECRETARY AND INDUSTRIAL MANAGER.

point as spun guncotton, is further chemically treated to neutralize the effect of nitration, thus rendering it non-explosive and fit for commercial use. Following its so-called denitration, it is then graded according to size and quality, carefully weighed, wrapped, packed and made ready for shipment. It is interesting to note that with the exception of chemical steps, the manipulation of the thread from the time it leaves the spinning machine, is almost identical with the treatment given raw silk. The process requires days to complete and is one demanding the utmost nicety of precision which cannot be entrusted to the care of inexperienced labor. At Hopewell, a large proportion of our employees are women, carefully chosen for their intelligence and skill, everything being done to insure their comfort and pleasant working conditions. In the handling of the skeins, every known precaution is taken to obtain the most uniform, even running thread, free from imperfections. We even go to such lengths as to treat the hands of certain employees so that no rough places may exist in either skin or finger nails which would tend to pull, scratch or mar the filaments of the yarn. All this extreme care, however, seems to be well justified as the



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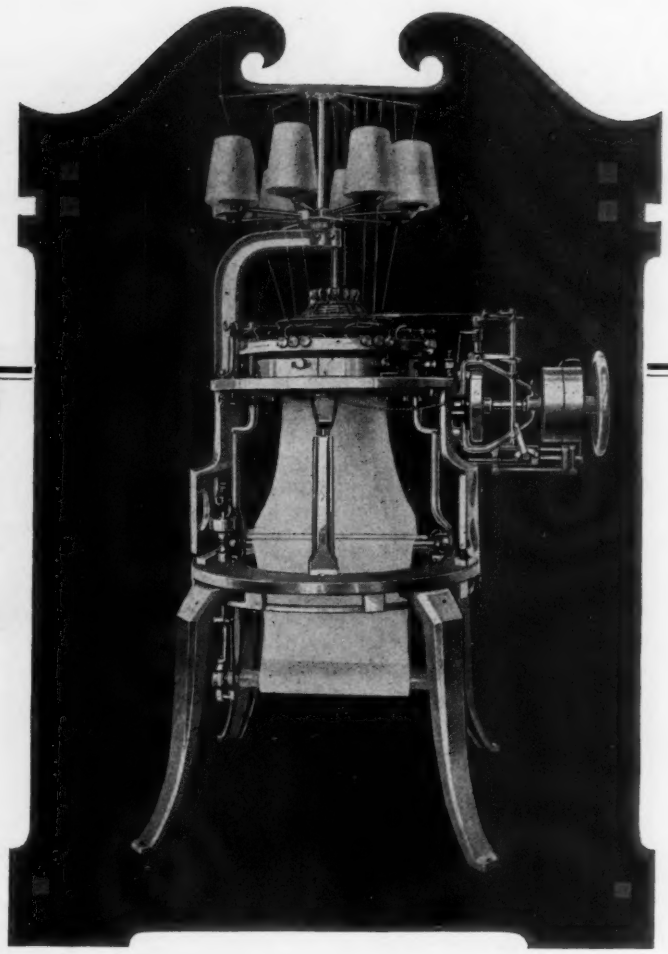

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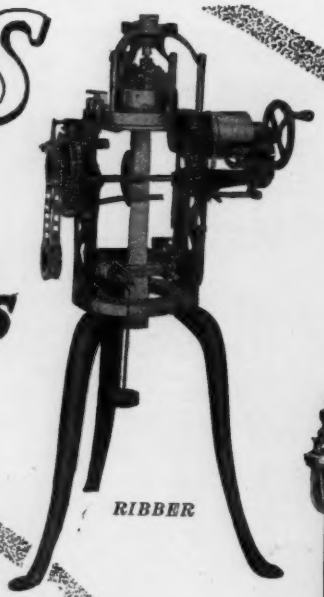

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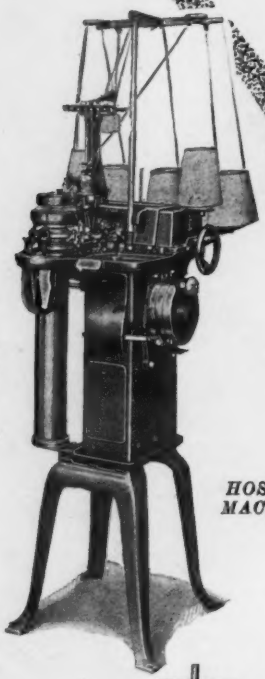
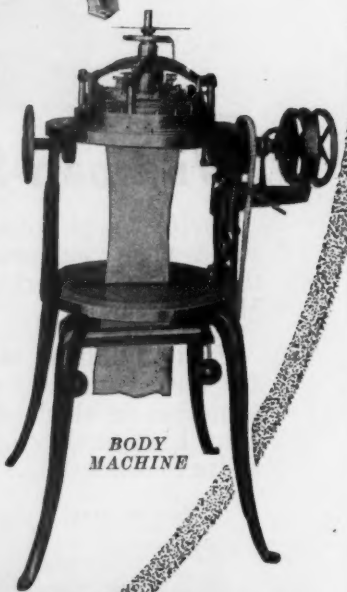


HOSIERY MACHINE



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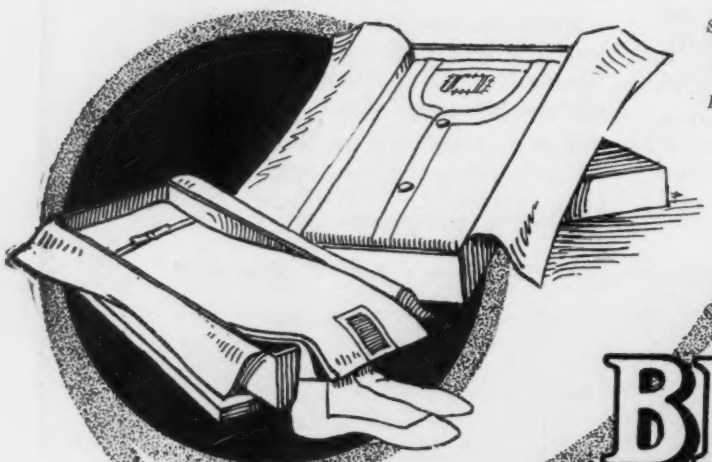

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BRINTON
KNITTING MACHINERY

discriminating user of artificial silk has been our friend from the beginning.

"In characteristics, artificial silk, in its dry state, is intensely strong and has a tenacity among the better yarns of 1.5 to 2. grams per denier. If wet, its tensile strength is materially reduced, but it completely returns when the yarn is again free from moisture. In appearance, it is quite similar to real silk although having a decidedly greater luster. It is so versatile, however, that it may be treated in such a way as to increase or reduce its brilliancy at will. In dyeing properties, artificial silk in general uses the same dyestuffs as cotton, although combinations of silk, cotton and artificial silk in the same fabric can be given a perfectly even shade if properly treated. In the case of acetate yarns, special dyestuffs and formulae must be used. In elasticity, it has an elongation before fracture of approximately eighteen or twenty per cent. It is adaptable for use in combination with every known yarn or can be used by itself in countless numbers of ways. Its reasonable price has been a contributing factor to many new industries and has made possible the creation of better and more beautiful textile fabrics than any other one thing. Its use is universal. There is no mystery about it, and there is nothing impossible to accomplish with it. Where a few years ago, it was used in only the coarser counts for purposes of decorative effect in heavy fabrics, textiles, braids, and the like, today it forms the chief and component part of the most delicate and sheer hosiery and underwear.

"It is difficult to estimate the total consumption of artificial silk in your branches of the industry, but an approximation would place a figure of about 8,000,000 pounds for the last year in both hosiery and underwear. Like all new things, its first use in hosiery was confined to heavy, coarse, cheap and sometimes not over meritorius articles. But simultaneously with the development of the yarn itself, came new experiments on the part of manufacturers of new machinery, the discovery of proper lubricating oils, new winding methods, and all the hundred and one little things necessary to create a better, stronger and more useful material. With the progress made by your industry in the handling of our product, came a corresponding demand and inquiry for finer and smaller yarns. Thus we see today a rapidly growing need for a yarn of smaller denier—one which will follow the tendency of the times to finer and more delicate fabrics. With this end in view, our company is specializing in counts as low as 60 denier which can be used alone or in combination with silk and the finer counts of cotton and worsted.

"When one stops to consider the enormous growth of demand for artificial silk in hosiery, one is apt to wonder why its use has increased so consistently. The first and most apparent answer is unquestionably that of price. Reduction in the price of anything always results in increased consumption, provided the article sold maintains its merit. Through the introduction of artificial silk, the price of hosiery has been kept at a lower retail value than perhaps any other article of clothing.

There are other fundamental reasons, however, for its tremendous popularity. The question of quality must not be overlooked. In the first place, artificial silk is a chemically and mechanically manufactured product. Each filament is spun from a mechanically drawn or drilled hole under definitely controlled conditions, thereby creating a uniformity of size and texture impossible in the case of nature's product, which comes from worms of varying size, and consequently different sized spinning apertures. No matter how much care may be used in the selection and grading of real silk, the artificial yarn can be made more even and consistently perfect than is possible in nature. Therefore, an evener stitch and more uniform product results from the artificial material. Then, too, the slight additional luster, with its brightness and its deep, velvety appearance lends added charm and attractiveness. A single strand of 60, 70 or 80 denier artificial silk twisted with three, four or more ends of 13/15 raw produces a more delicate fabric as well as a more even stitch and of better appearance than can possibly be produced by a similar hose of all silk, unless the highest grade of yarn is employed, again emphasizing the price differential. When combined with other yarns, different color schemes and combinations make possible an unlimited variety of new and wonderful pieces.

"In the case of underwear, the increased use of artificial silk is again fostered by the low cost of material, but the benefits to the consumer from the use of our product in the completed garment are much more marked. The surprising thing about it is that few manufacturers, retailers, or salesmen appreciate or speak of its most apparent quality—its power of absorption. I refer directly to sanitation and health. Underwear made from artificial silk, or containing it, absorbs perspiration and moisture from the body allowing evaporation to take place, at the same time keeping the skin dry and comfortable. In an artificial silk garment, one has all of the softness so desirable in real silk, without the cold, clammy dampness of the material made from a non-absorbent yarn. The ideal suit of underwear is made from a combination of artificial silk and silk, wool or cotton as it has all the benefits of hygiene, at the same time retaining its stability under every condition. It is well known that real silk rots from perspiration while artificial silk is practically unaffected by the acids of the system. Real silk, being an animal product, turns yellow with age, while artificial silk in the white, retains its natural color.

"From the standpoint of the consumer, artificial silk is not weighted, and, therefore, outlasts and outwears any fabric containing tin or other metals. You are all familiar with the women's knitted underwear made of twisted combinations of silk and artificial silk and with what success it is made commercially. Today there is being put on the market a combination of fine denier silk and artificial silk in men's underwear to retail at popular prices. It is destined to take its place as the real health underwear for men and thus far represents the highest type of development. During the past winter, two manufacturers, after extensive experiments, produced a plated material of artificial silk and long fiber cotton at a price only slightly above the usual garment of all cotton. I am told that wherever samples have been shown orders have followed, and we are led to expect a large demand for such a combination.

"You are, unquestionably, so much more familiar with the handling of artificial silk in your mills than a mere yarn manufacturer that I shall not attempt to touch on its manipulation or treatment beyond calling your attention to the fact that there are now available in the American mar-

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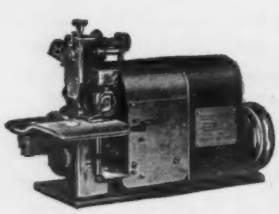

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ket four or five entirely different generic kinds of yarn, each one of them with markedly different characteristics. It will not be long before this fundamental fact is well recognized and the point brought home that certain makes of artificial silk are better adapted for certain results than others, and that from a standpoint of economy, as well as quality, the best and not the cheapest will always result in less 'seconds.'

"Another hint, which is too often unappreciated, is on the subject of lubrication. Only the highest grade of spraying or dipping oil should be used. Neatsfoot, the old favorite, still ranks in the lead provided a high grade neatsfoot is used. Today, however, purchasers of neatsfoot oil are inclined to look at price too closely, thereby causing trouble in the dyehouse, and sometimes, if completed materials are allowed to stand for an indefinite period before the oil is removed, the chemicals used to purify the cheaper grades of neatsfoot oil, react unfavorably on the yarn. Certain kinds of mineral oil, contrary to the prejudice against it, are perfectly good. If a mineral oil be selected which is absolutely non-acid and which comes out readily in the scouring bath, it has two distinct advantages—it will not grow rancid and will not deteriorate the yarn.

"As referred to previously, artificial silk was originally adopted in the hosiery and underwear trades as a substitute for real silk and was sold on a basis of price. Ten years of history, however, have developed two things—

1. With keen competition among manufacturers of yarn, a very superior product has been developed.

2. With its constant and increasing use in your industries, new machinery and new methods of handling have created far better fabrics than were ever dreamed of in the first blush of Chardonnet's triumph.

"I wonder how many of you realize that you are today producing the finest hosiery and the finest underwear in the entire world; that the use of artificial silk in these very materials needs no apology but is the mark and stamp of high grade merchandise?"

At the conclusion of his address, Mr. Clarke expressed it as his opinion that after the reduction on February 1st, there would be no further substantial recessions in the price of artificial silk.

The Dyeing of Hosiery.

The second and last speaker presented by President Zens for the Wednesday session was Dr. E. H. Kilheffer, vice-president of the Newport Chemical Works, whose address on "The Dyeing of Hosiery" was especially apropos in that he dealt chiefly with this process as it related to the various combinations of fibers in stockings; and inasmuch as the introduction of artificial silk, discussed by Mr. Clarke, has brought on new complexities which have produced new dyeing difficulties. Dr. Kilheffer's address follows in part:

"The dyeing of hosiery is a rather large subject and I do not propose to attempt any complete or detailed discussion or description of all the processes involved. During the last few years new complexities have been introduced which are very fertile producers of dyeing difficulties and I shall address myself chiefly to these as being perhaps the most interesting and at the same time the most troublesome phase of the work in your dyeing departments.

"From the standpoint of the dyer the simplest work he has to deal with is that where only single fiber is involved as either all cotton, all wool or all silk. In each of these cases the dyeing operation is comparatively simple and follows the usual rules for the dyeing of the respective fibers in other forms.

"Trade requirements demand, however, that combinations of various fibers shall be used and for varying reasons. The most common combinations of fibers are cotton and silk, cotton and wool, and cotton and artificial silk. More complex mixtures are the following: cotton, wool and silk; cotton, silk and artificial silk, and cotton, wool and artificial silk.

"Cotton and silk mixtures are dyed principally with direct colors with the addition of some acid or neutral dyeing colors to fill up the silk or tone its shade. Black is dyed with either a developed or a direct black, depending on the degree of fastness desired. Cotton and wool mixtures are dyed with union colors, i.e., combinations of direct dyeing cotton dyes and neutral dyeing wool dyes specially compounded to produce solid shades which will be the same on both cotton and wool. Cotton and artificial silk mixtures are dyed with direct dyeing cotton colors.

"Now the real dyeing difficulties arise when the second and more complex class of combination of fibers is used. It may be well to consider for a moment the reasons for these mixtures of fibers. We may sum these up as follows: Attempts to lower costs; imitations of better qualities, and desire for novelty or decorative effects. Just at this point I want to point out to you something the importance of which cannot be overestimated:

"There should be the greatest cooperation between the designer or styler, or knitter or whoever is responsible for the composition of the stock and the dyeing department. Very often the dyeing department can offer suggestions as to either composition or arrangement of the fibers that will so simplify the work in the dyeing house as to mean the saving of a good deal of money.

"If, on the other hand, there is little or no cooperation at this point, then the stock is manufactured to the specifications demanded by the cost which is to be had or the ideas of the designer as to composition or perhaps both considerations. The finished stock then reaches the dyehouse for the most important operation of all if the goods are to sell and furthermore give satisfaction after being sold.

"Now the more complex the mixture of fibers, the more difficult is the selection of colors which will satisfactorily and evenly color them. The differing affinities of the different fibers for the dyes must be taken into account and such dyes used in combination with each other as will overcome these differing affinities. Not only must the dyes be carefully selected, but the temperature often must be so manipulated as to obtain the desired result.

"A second consideration then naturally follows, which is that the more varied the dyeing recipes are, the more accurate control of the dyeing process is necessary. When you consider the type of apparatus in many of our dyehouses, you will realize at once the difficulties there are in the way of accurate control. Certain it is that accurate control of the kind necessary in, let us say, the chemical process of the manufacture of the dyes themselves is not often possible in a dyehouse.

"Both the proper selection of dyes and the question of accurate control of the process are of particular importance when it comes to the question of shading on one or

more fibers in the mixture. Now how does this affect the final product of your mill?

"1. Very often poorer fastness is an inevitable result because the dyes necessary to color all of the mixed fibers uniformly are often of only moderate fastness. In this connection greater cooperation between knitting and dyeing departments is of great value for very often some slight alteration in the proportion of the fibers will profoundly affect the dyeing process.

"2. Another result is the loss in the dyehouse of the saving effected in the construction of the material. This loss may be because of the particular dyes made necessary, the unavoidable waste of dye in the difficult process of dyeing and shading, and the longer time required to get out the batches which in turn results in lower production.

"3. Finally all of the foregoing considerations lead to the important one of wearing qualities after the article reaches the ultimate consumer.

"If in order to get the particular shade or effect that was desired, it was necessary to use colors with only moderate or perhaps even poor fastness, then the ultimate purchaser is disappointed because the colors perhaps run in washing or are very poor in their fastness to perspiration, or if, on the other hand, it is necessary to do quite considerable shading which means a longer handling of the material in the dyebath, then the artificial silk contained in the mixture may be tendered to some extent or the appearance of the stock itself may not be good.

"It would almost appear as though sometimes the manufacturers expect impossibilities in the dyehouse, and I refer now to some of the combinations of mixed fibers which are expected to come out of the dyehouse in solid shades and with no variation in tone between the component fibers.

"Broadly speaking, the direct cotton dyestuffs are the chief reliance of the dyer for the coloring of these mixed fiber hose. Where multiple color effects are desired the use of the different fibers makes possible an almost endless number of interesting effects because of their different affinities for dyes before described.

"If for the moment we exclude wool and silk from our consideration, just see what possibilities there are in the use of cotton in combination with one or several varieties of artificial silk. Briefly, the principal artificial silks are cuprammonium, nitro, viscose and acetate. The nitro and viscose are probably most used and the best known at the present time in this country, but acetate silk is extremely interesting because of its much superior wearing properties and its use is sure to increase rapidly. In the case of acetate silk there are two separate and distinct commercial products on the market at the present time, Lustron and Celanese.

"Nitro (Tubize) and Viscose are both readily dyed with direct cotton colors, but the acetate silks have little or no direct affinity for much else besides basic dyes and even with these the two qualities of silk have quite different affinities."

Here the speaker exhibited some samples showing how differently and how selectively dyes take on mixtures of fibers.

"You can readily see the possibilities as well as the difficulties to be encountered in the dyehouse because of the facts I have tried to bring out," he continued, "and may I point out once more that the possibilities may be increased and the difficulties decreased if you will make up your various styles and combinations by and with the advice and help of the dyer who must afterwards satisfactorily dye them.

"You already know that all of the dyestuff suppliers maintain laboratories and experienced men and that both are at your service for the working out of problems of this or any other nature.

"In closing I want to address just a few words to you from and as an American manufacturer of dyes.

"You very reasonably expect the American people to buy hosiery and underwear of your manufacture nor could you exist were you wholly dependent on foreign trade. The American manufacturer of dyes doesn't have a commodity to sell the entire American people, but is dependent entirely on you as consumers of his product. Whether he remains as one of the industries serving your larger one, therefore, is largely in your hands. We have and are now working to increase the number of products we make and which you need. If there is something you require which is not now on the market, cooperate sufficiently with us to tell us what it is so that we in turn can get to work on it.

"The American dye monopoly that some folks would have you believe is a probability is in fact an utter impossibility because of our basic laws. The monopoly of our German competitors is an accomplished fact. We are agreed that monopolies anywhere are detrimental. A foreign one we can't even control.

"The purpose of these few remarks is simply this—we need your support."

Following Dr. Kilheffer's address, the report of the nominating committee, made by D. L. Galbraith, was received, and the Association elected the following officers for the coming year: President, Joseph H. Zenz; first vice-president, Gustave Oberlaender, Berkshire Knitting Mills, Reading, Pa.; second vice-president, Norman Johnson, Jr., president, Burson Knitting Mills, Rockford, Ill.; treasurer, Ernest Blood; members boards of directors for two years: John Wyckoff Mettler, W. W. Moyer, Thomas W. Buck. The name of W. H. McLellan, of New Orleans, was presented for the board of directors, but Mr. McLellan refused to accept the nomination, and on Thursday morning Rupert C. Aycock, president of the Aycock Hosiery Mills, South Pittsburgh, Tenn., was elected to the board for two years.

The Thursday Morning Session.

John Leitch, exponent of industrial democracy, was the first speaker of the final session of the Association. Mr. Leitch outlined the plan of his method of operating a business, stating that "I have organized manufacturing plants on a method termed industrial democracy for about ten years. Some men shy at the word 'democracy' when applied to industry; they will wave the flag and shout when the American flag is raised, but when they hear of democracy in industry they actually think it means Bolshevism. Some men think that in industrial democracy we turn over the business to the workers; that it just exactly the reverse of the true condition. Men who have had the actual experience of operating their plants this way will tell you they have more control over their business than ever before."

Mr. Leitch then outlined the plan of industrial democracy, which has become generally familiar throughout the country. He told of some individual experiences among the

700 firms which he stated are practicing this system in this country and foreign nations, and pointed out that the basis upon which the plan succeeds is that it affords all sides with all of the facts in the case, rather than allowing them to act with only one side of the question before them. He told of how industrial democracy had broadened the viewpoints of both workers and executives and had brought them to a better understanding of each other.

The speaker then referred to a national cabinet composed of 36 executives in whose plants the plan in question is operated. These men, he said, codified the laws of industry as exemplified in the conduct of industrial democracy. Reading these, he pointed out that among them were recognition of cooperation, justice, and cooperation, and energy, culminating in the final aim of all proper business, that of service; the development of the individual; and other fundamental principles.

In conclusion Mr. Leitch invited questions from the floor. Mr. Mettler asked the speaker to explain a reference he had made to a saving and the distribution of dividends, and asked how that was determined. "Suppose your total overhead and total wages for a year were $1,000," said Mr. Leitch, "and your total production amounted to 2,000 units. Suppose next year your wages still continued the same and your overhead runs the same, but you produced 2,200 units. You have ten per cent more units on which you have no more cost. You have a profit on that ten per cent in goods and you can afford to pay the worker one-half of the saving that has been made." Mr. Leitch explained that the usual system was to make rough estimates at regular frequent intervals of say two weeks, and pay a dividend on that, making it plain that any necessary alterations in the figures were to be made when the exact amounts of the dividends due were produced at the end of the fiscal period.

Mr. Mettler next asked in what way industrial democracy differed from premium systems. "Where you give a premium to the individual," Mr. Leith explained, "he is interested only in his own work. With industrial democracy there is a collective interest on the part of every one."

Another member stated that what had always troubled him was what occurred when there was no profit. He understood that dividends earned could be divided but that he did not understand what occurred when the plant operated at a loss. The Riverside & Dan River Cotton Mills met that condition in 1921, said Mr. Leitch, and the workers voluntarily suggested a 25 per cent reduction in wages on account of the bad condition of business. He cited another instance in which the workers offered to make a loan to the management in a business depression when the firm was facing a crisis.

In conclusion, Mr. Leitch said, "I have recently had an article put in Collier's stating that industry needs a constitution just as much as our original states needed a constitution. That is a new idea that we need a constitution; we also need a declaration of interdependence, showing the true relationship between our capital and labor."

The last speaker of the convention was Charles A. Cason, vice-president of the Chemical National Bank, New York, who brought to the manufacturers a cheering address on business conditions. Mr. Cason, while not essaying as a prophet, presented both the unfavorable and favorable phases of the present business situation, declaring that the latter outweighed the former by a considerable degree, and placing impressive emphasis upon the part that the "Spirit of America" is playing in the business world of today. After this address the election of Mr. Aycock to the directorate was made.

The concluding feature of the convention was the annual luncheon of the Association at the Bellevue-Stratford at 1 o'clock on Thursday. The popularity of this feature was greatly enhanced this year by reason of the fact that the chief speaker was Captain Irving O'Hay, whose recounting of his life history and experiences held the diners interested for nearly two hours. Captain O'Hay delightfully entertained those attending the annual banquet of the National Association of Cotton Manufacturers in Boston in October, and his talk at Philadelphia was no less entertaining. President Zens was toastmaster at the luncheon.

The Machinery Exhibit.

In accordance with custom, the annual Knitting Arts Exhibition of the National Association of Hosiery and Underwear Manufacturers was held at the Commercial Museum, Philadelphia, during the week of April 7th to 11th inclusive, in conjunction with the annual convention, held on Wednesday and Thursday of that week.

As a credit to the individual exhibitors, the association, and Chester I. Campbell, manager of the show, the exhibition this year was an unparalleled success in the history of the Association's exhibits. There was in evidence a wholesome spirit of cooperation and satisfaction during the event. Everyone concerned seemed pleased with the affair and the close of the week brought to conclusion a profitable and valuable exposition.

The Exhibition demonstrated, very effectively, the value and influence of such displays in the field of textile manufacture. It has, in truth, established itself as an integral part of the industry, and under the efficient management of Mr. Campbell, together with the active spirit of the Association under whose auspices it is held, the show is, together with the Association convention, placing Show Week in Philadelphia in a position of increasing importance and value in the business life of the American knitter. Indeed, its scope is being extended until now it is becoming international, as other countries, notably Canada and England and its other provinces, are sending representatives among both exhibitors and manufacturers.

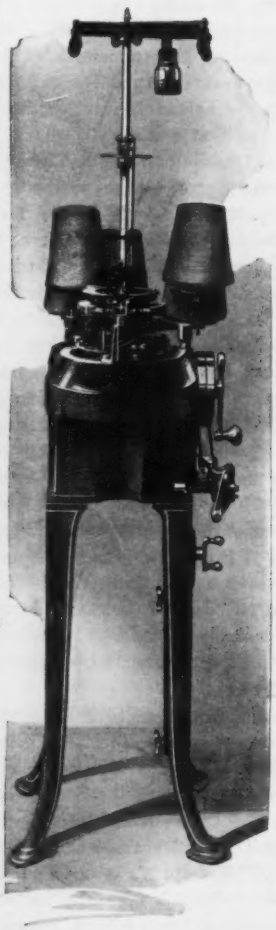
With over a score of exhibitors more than displayed last year on hand, and all exhibits practically in readiness, this year's exhibition was formally opened at two o'clock on Monday afternoon and continued until the doors were closed on Friday evening. The Commercial Museum, the home of the show for the past several years, was fittingly decorated for the event, with Philadelphia's colors, and the national emblem appropriately draped over the rafters, which, together with the effective lighting scheme, presented a most pleasing setting for the uniformly attractive booths. The usual Boothby restaurant was operated in the rear of the hall this year for the benefit of those who desired to secure their meals within the building. The hosiery style show of last year was not repeated—and opinion was divided as to the result of its absence, the consensus of feeling among exhibitors, however, being that by its own attractiveness it possibly detracted attention

HIGH PRODUCTIVITY

is the Outstanding Feature of

STANDARD Hosiery Machines
NYE & TREDICK Knitting Machines

The scientific production resulting from a half-century's experience enables us to offer with our machine



Simplicity

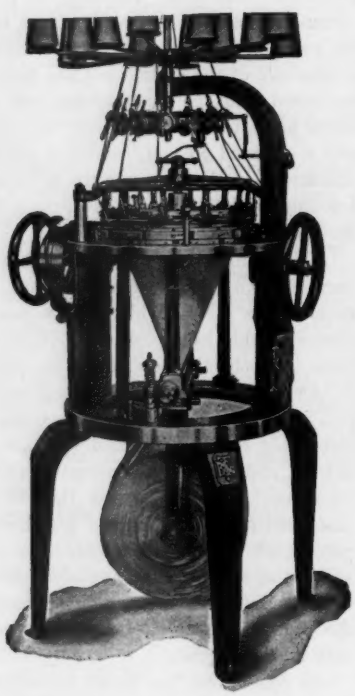
Durability

Quality Fabric

Economic Operation

Consistent Performance

Increased Production



Improvements and new attachments have been completed.

Write for complete details to the new combined concern which is offering these two well known machines to hosiery and underwear manufacturers.

STANDARD-TRUMP BROTHERS MACHINE COMPANY

FACTORY and OFFICE
Beech and Anchorage Streets, Wilmington, Del.

SHOW ROOMS
121 North Broad Street, Philadelphia, Pa.

from the main features of the show, and therefore no serious criticism was heard from exhibitors concerning its omission this year.

One feature of the exhibition and its concurrent convention which was of sufficient importance to attract attention even beyond the southern delegations, was the unusual way in which the South was represented, both in exhibits and in knitting manufacturers who attended the show. Discussion with some of the leading exhibitors of important machinery developed the fact that of the business actually transacted and orders taken during the week, a goodly portion of the equipment purchased was for shipment to southern mills. In the convention hall during the sessions, and at the hall inspecting the exhibition, were noted the faces of many executives from southern plants. The West was also well represented, which, together with the usual attendance from the eastern section, rounded out the attendance and representation and gave indication of the universal attraction which the occasion holds for those interested.

Every exhibitor was at his best in displaying and demonstrating his wares, and much of value was presented for the first time at this year's show. Descriptions of some of the representative displays follow:

Aberfoyle Manufacturing Company, Chester, Pa., maintained their usual comfortable reception space, with salesmen present throughout the week. Among those in attendance during the show were: James McCrudden, J. P. Holt, J. G. Holt, "Chick" Harding, P. B. Wallace, R. W. Yeabsley, F. W. Hancock, Samuel Rowcroft, F. W. Samson and James Holt.

American Laundry Machinery Company, Cincinnati, Ohio, in spaces 72 to 76 and 111 to 108, featured primarily its complete line of rotary hosiery dyeing machines; a 300-pound Monel metal machine, a 200-pound Monel metal lined, Monel metal cylinder machine; a small wood all brass-trimmed sample machine, and the glass end demonstration machine. Also shown were the positive and safe Humatic extractor with silk finish copper basket, the American rotary hosiery press with the new processed apron, the American 44-inch knit fabric calender, and the American underwear finishing press. George G. Rups was in charge, and H. G. Mayer and William C. Dodson represented the Charlotte office. John H. Gecox, Paul J. Abrams and S. G. Dabner, also W. S. Taylor, general manager, and O. H. Taeschner were present during the week.

American Scrubbing Equipment Sales Company, Hannibal, Missouri, were showing an interesting line of scrubbing systems, which were in demonstration. Among these was the No. 20 model scrubber, with automatic pressure and automatic water and powder feed, with larger tank now carrying 15 gallons, and larger powder equipment, which, together with the105-foot spring reel and a new style switch for starting, formed new features exhibited for the first time at Philadelphia. Other equipment shown included the No. 10 Junior scrubber, the No. 5 mopping machine, the No. 2 mop truck, the No. 10 absorber, and the No. 1 substation, and a new solid felt polishing block for the Junior machine. H. S. Jones, the Philadelphia representative; H. Clement, of New York; J. W. Hopkinson, of Newark; E. A. Aylor, of the service department, and J. H. Lindstrom, the eastern division manager, were in attendance.

American Yarn and Processing Company, Mt. Holly, N. C., showed samples of their fine combed yarn, and were represented in their regular reception space by their Philadelphia representatives, Forrest Brothers. Mr. Hatch, of Mt. Holly, was also present greeting his many friends.

Boger & Crawford, Philadelphia and Lincolnton, N. C., spinners and mercerizers, had as an interesting feature of their booth a cone of yarn containing 142,800 yards of 40s/2 mercerized yarn in various colors, which weighed eight and a half pounds. This concern manufactures yarns in numbers from 3s/2 to 120s/2. Representing the firm at the booth were R. C. Boger and Albert Crawford, and W. J. Crummer.

Charles Bond Company, 617 Arch Street, Philadelphia, manufacturers of "Bondaron" belting, were displaying a line of general mill supplies. It was announced at the exhibit that this concern has just been appointed representatives in the Philadelphia territory for The Reeves Pulley Company, of Columbus, Ind., handling the Reeves variable speed transmission. This was on exhibit at the show. "Bondaron" round belting, made especially for use in connection with sewing machine or other grooved wheels, was a part of the exhibit; the Braime oiler, Mexican graphite, Alligator belt lacing, and a new "Flexco-Lok" lamp guard, were other features of the display, which also included casters, particularly a special type with a thread guard to prevent accumulation of thread and waste, various types of gears, etc.

H. Brinton Company, 3700 Kensington Avenue, Philadelphia, had their usual operating exhibit showing a 16-inch, eight-feed, 17-needle machine, with wheels, for making silk underwear; a 4¼-inch, single feed, automatic machine for making drop stitch ribbed misses' hosiery; a 3¼-inch, two-feed, sinker top machine with patent wheels, for making fancy tops for children's hose, etc.; a 1¾-inch sinker top necktie machine; a 1¾-inch, French welt, 240-needle, for hosiery; a 3½-inch, Model C knitter for ladies' hosiery. H. S. Horrocks was in charge of the exhibit assisted by William H. Allerton, Eric Cordin, J. R. Forrest, and Ed Newell.

Cooper Hewitt Electric Company, 95 River St., Hoboken, N. J., were demonstrating industrial illumination, particularly as applied to the textile industry. This company, which has specialized in the field of factory lighting for the last 21 years, has now applied to its product a particularly appropriate name for the industrial field—the "Work-Light." The Cooper Hewitt booth at the exposition displayed "Work-Light" lamps, together with photographs and blue prints of installations in use in knitting and other textile mills. A feature was the "visual acuity" cabinet, an ingenious device whereby quality of illumination was demonstrated without recourse to technicalities. Among those present were Charles F. Strebig, sales manager, M. B. Firehock, E. L. Elliott, H. G. Blauvelt, L. H. Cook and Mr. Kuhne.

Dixie Mercerizing Company, Chattanooga, Tenn., through their Philadelphia representative, Cameron & Pfingst, exhibited samples of their yarn, 26s to 80s/2 mercerized, and maintained reception space. William Smith, from the Chattanooga office, Arnold Henderson, of Chicago, George B. Pfingst, Sr., George B. Pfingst, Jr., F. Orsborne Pfingst, and J. B. Cameron, of the Philadelphia house, were present during the week.

Count de Chardonnet
1840—1924

French nobleman and scientist, devoted his life to the discovery and perfection of artificial silk. In 1884 he produced the first important man-made textile, by what is now known as the Tubize process.

The discovery of Tubize

the first important man-made textile

It was at the Paris Exposition of 1889 that the discovery of artificial silk was announced to the world. In recognition of this important contribution to science and industry, its inventor, Count Hilaire de Chardonnet, was awarded the Grand Prix and the Legion of Honor ribbon.

The new textile as developed by Chardonnet, afterwards known as Tubize, won instant popularity. Its amazing beauty, strength and softness created for it an immediate demand. The first factories (one of the most important was located in the town of Tubize, Belgium) soon proved inadequate and others were added. Finally, the vogue of Tubize crossed the Atlantic and the Tubize Artificial Silk Co. of America was formed, with a mammoth plant at Hopewell, Virginia.

Here, Tubize has been made under the Chardonnet patents in constantly increasing volume, until today, only three years after the opening of the Hopewell plant, its production is second in the American artificial silk industry.

Upon request we should be glad to send a free copy of "Artificial Silk," the most recent non-technical book describing this tremendously interesting industry.

Always made from a cotton base, the unusual beauty and strength of Tubize fine sizes have become proverbial the world over.

TUBIZE ARTIFICIAL SILK CO. OF AMERICA

Sales Office: 303 Fifth Avenue, New York

Philadelphia. Hopewell, Va.

Tubize

Pronounced "two-bees"

E. I. du Pont de Nemours & Co., Wilmington, Del., had arranged an attractive display and reception space. In a cabinet extending across the end of the entire space, they showed du Pont art fiber silk dyed with direct Diazo Ponsol colors, basic Sulfogene, and Pontamine fast colors. In the center of the case were shown hosiery in popular shades, of mercerized and art silk, mercerized art silk and pure silk, and art silk and pure silk combinations. A rotunda in the center of the booth displayed samples dyed with various duPont dyestuffs, and a daylight lamp was used for showing shades. Robert A. Carter was in charge, with C. H. Hageagan, William Beattie, Roger Franklin, Charles Hamil, Warren Thompson, Joe Burwell, C. C. W. Wilson, W. G. Hanlin, technical demonstrator, and Mr. Fenning, sales manager for duPont art fiber silk, in attendance at various times throughout the week.

Eclipse Textile Devices, Inc., Elmira, N. Y., featured the Van Ness random dyeing machine which attracted so much attention at its premiere showing at last year's show. This is for dyeing yarn on the cone under pressure, producing a random dyed yarn for mottled effects. Other features of the exhibit were the automatic yarn cleaner, and the Eclipse slub catcher and tension device. J. C. Ferguson, general manager, J. P. Gary, L. A. Uttrich, K. D. Lutes, Henry Van Ness, B. H. Hasbrook and Leon W. Campbell were in attendance.

Fletcher Works, Inc., Glenwood Ave. & 2nd St., Philadelphia, had an operating exhibit, demonstrating two motor-driven extractors. One of these was their underdriven type machine with a vertical motor mounted underneath the machine. This extractor has a special visible forced feed oil circulation whereby the operator can see the oil circulating on the ball bearings at all times. Another feature is that there is but one moving part in the machine as the motor rotor is mounted directly on the basket shaft. The other extractor was the vertical motor-driven type, with the motor mounted over the basket, connected directly to the shaft by a flexible coupling, eliminating the centrifugal clutch. Both extractors shown are started by pushing a button, and when the brake is applied current is automatically shut off. The company was represented by C. Wm. Schaum, W. H. Rometsch, Jr., and H. G. Eynon.

The J. B. Ford Company, Wyandotte, Michigan, exhibited their usual display of Wyandotte products and samples of silk, cotton and wool on which these products had been usd in the dyeing, bleaching, finishing and scouring processes. F. S. Klebart, of the Wyandotte office was in charge, assisted by J. W. Turner and R. G. Barr, of Philadelphia, and J. F. Flaherty, of Providence.

Foster Machine Company, Westfield, Mass., featured their new Model 75 precise wind machine, designed for winding silk and artificial silk knitting yarns, and also for winding sewing threads on tubes. The model 30 cone winder was also shown, in operation, winding different kinds of knitting yarns, worsted, mercerized and cotton, and the No. 32 spooler tension for filling wind spooler, and the No. 20 tension were also demonstrated. T. L. Connor, sales manager, and D. W. Bridgman, C. P. Terry and James Wood were present.

Franklin Needle Company, Franklin, N. H., showed samples of their latch needles, sinkers, points and guides, and maintained reception space. L. J. Allen and G. L. Hancock, of Franklin, and John A. Eberly and some of his assistants, representing the company with headquarters at Reading, Pa., and Knoxville, Tenn., were in attendance.

Grand Rapids Textile Machine Co., Grand Rapids, Mich., had a moving exhibit, featuring three machines in operation: The improved calender No. 335, especially adaptable for sweater cloth and artificial silk; the No. 100 automatic length cutting and piling machine, the No. 1228 Universal folder calender and finishing machine, and the No. 3, turning and loading machine, all demonstrating recent refinements and improvements. H. A. Shields, president and general manager, C. W. Bacon and W. H. Shields were in attendance throughout the week.

Granite State Needle Company, New Salem Street, Laconia, N. H., exhibited a panel displaying a complete assortment of latch needles arranged in an attractive manner. George W. Mayo, of Laconia, and J. L. Bartoin, of Philadelphia, were present.

Hemphill Company, Pawtucket, R. I., were as usual demonstrating a comprehensive line of "Banner" automatic knitting machinery. Among the models shown were: a 240-needle, 3½-inch, 54-gauge, split foot machine making high grade seamless silk hose; a 200-needle, 3½-inch, 48-gauge, half hose machine, with split foot attachment, making a fine cashmere hose in natural wool and cotton sole; a 200-needle, 3¾-inch, 48-gauge, accordion stitch combination machine making novelties and ribbed hosiery for children, misses and ladies; a 220-needle, 3½-inch, 48-gauge, half-hose machine, combination sinker, drop stitch and stripe effects; a 144-needle, 2½-inch, 48-gauge machine tip and stripe machine, producing drop stitch effect for children's fancy top hose; machine making ladies' pointed heel on seamless hosiery; a 176-needle, 3¾-inch, 36-gauge, ladies combination machine with drop stitch effect, making a novelty wool hose; and a 260-needle, 3¾-inch, 54-gauge, ladies' combination spring beard needle machine, with new solid butt spring beard needle; a 248-needle, 3½-inch, 54-gauge, ladies' combination spring needle machine, for making novelty effects; and a 260-needle, 2¾-inch, 54-gauge ladies' combination split foot machine making a ladies' silk seamless hose. Representatives stated the company was so successful with the split foot half hose that they have applied this feature in the last-mentioned machine for ladies', which is being enthusiastically received. John Lawson, president; Maurice L. Frost, vice-president; Howard W. Fitz, treasurer; George McDowell, and James McDowell, of Philadelphia; Eugene M. Gunning, Frank Jones, Herbert Gosling, Robert Quinlan, Howard Kettelby, Stephen Morris, Hoy Gross, and Gustave Gagne were present during the week. George McDowell was in charge.

Kali Manufacturing Company, 1404 North Front Street, Philadelphia, Pa., featured their "Hydroxy" line of chemical, including this well known trade-marked product in the "Hydroxy" art silk coning oil; the "Hydroxy" direct color oil for use in the dyebath to level shades, particularly on artificial silk; "Hydroxy" boil off oil for degumming pure silk; "Hydroxy" art silk boil off oil for removing oil from artificial silk before dyeing; "Hydroxy" art silk coning oil used in coning and winding artificial silk; "Developene" for intensifying sulphur colors, softening at the same time, wool scouring oil, etc. James A. Branegan, president, and S. G. Davenport, secretary-treasurer, were present, with Messrs. Donlen and Wall, and Hoffman and Willis from Newark, assisting.

Kaumagraph Company, 350 West 31st St., New York City, featured their new permanent dry transfer. H. A. Keech, the Pennsylvania representative, and G. M. Porges, of New York, were present.

Klauder-Weldon Dyeing Machine Company, Bethayres, Pa., were demonstrating a new dyeing machine, shown for the first time at this exhibition. This model was a two-pocket, ten-pound type. The machine is constructed of monel metal, with motor drive. It has automatic reverse at each revolution, a close fitting cover to keep the steam heat in, with feed bowl on side. The representatives also explained the company's other dyeing, bleaching and scouring machinery. Frank Q. Miller, superintendent of the shops, Alex Fea, salesman, and Henry Higgs, New England representative, were present during the week.

Link-Belt Company, Chicago, Ill., featured an attractive panel showing a variety of their silent chain drives in operation. Photographs were exhibited showing the silent chain applied to the four-frame drive for full-fashioned machines, and on the line shaft on circular machines. Other applications explained were ribbers, loopers, winders, etc. It was of interest that ten exhibits in the show were using the Link-Belt chain for driving their machines. H. D. Mitchell, of the Philadelphia office, was in charge.

Mathieson Alkali Works, Inc., 25 West 43rd St., New York, as last year, featured their improved equipment for making bleach solution. Also shown were samples of "Eagle Thistle" brand products for finishing. W. A. Field, of Philadelphia, was in charge of the booth.

Merrow Machine Company, Hartford, Conn., used double their usual space, and had in operation a number of the standard models of their high speed overseaming, overedging and shell stitch machines. Especial emphasis was given two new models of machines put on the market since the last exhibit. One, a Style 60-Q three-thread looper machine, to produce very small shells, particularly applicable on children's knit underwear and for finishing many kinds of woven fabrics. The other, a Style 60-YM machine, is especially designed for mockseaming the backs of ladies' stockings. Special mechanism permits the operator to trim and sew with more stitches when it is desired to shape above the heel at the ankle and automatically by knee or foot control to sew with fewer stitches and without trimming. E. H. Allen, Philadelphia manager, was in charge, with P. G. Merrow, secretary-treasurer of the company, J. G. G. and O. W. Merrow, of New York, and W. J. Longley, J. B. Tolan, and L. H. Talmadge and D. A. Carlson, also in attendance during the show.

National Aniline & Chemical Company, 40 Rector St., New York City, had their usual attractive display showing the application of "National" colors to knitted goods. In the center of the large booth, behind glass, was a unique presentation of samples showing the use of the extensive line of colors. The absence of Dr. Louis J. Matos was noted with regret by his many friends. In his stead, C. L. Gilbert was in charge, assisted by F. Mitchell, W. Scheller, and Mr. Chase and others.

Philadelphia Drying Machinery Co., 3351 Stokely Street, Philadelphia, maintained an operating exhibit showing the new Monel metal hosiery dyeing machine, which, it was pointed out, is particularly well adapted for the light color dyes now popular. Photographs of the continuous carbonizing process were on display, and a model "Hurricane" loop dryer for underwear, cotton crepes, etc., was shown. W. W. Sibson, secretary-treasurer; C. H. Reumann, H. O. Kaufman, C. H. Thomas, E. L. Smith, and Howard Morshead, southern representative, were present.

Philadelphia Metal Drying Form Co., 1756 North Randolph St., Philadelphia, Pa., showed in operation their steam-heated adjustable full-fashioned metal drying form for ladies' hosiery. J. O. V. Stetten represented the company and was in charge of the booth.

Proctor & Schwartz, Inc., 7th Street & Tabor Road, Philadelphia, featured a working demonstration of the "Proctor" automatic boarding, drying and stripping machine for hosiery, in a new model. The new Model D differs from Models A, B and C in that it is designed for two operators—a boarder and helper—and for higher speed in the operation. It was stated this new type has attained double the output of the single-operator models, in plants where it has been installed. In addition to this feature, the "Proctor" table hosiery dryer—a combined boarding table and drying machine—was shown, and other types of "Proctor" dryers for all kinds of textile materials were illustrated in an interesting display of photographs, Charles T. Griffith, manager of the hosiery dryer department, was in charge, and other representatives present were C. S. Tiers, P. G. Kent, C. H. Dennison, J. F. Moranz, L. E. Foyle, W. G. Rihl, and Fred Strockbine.

Scott & Williams, 366 Broadway, New York City, showed their regular line of machines. Special attention was given to their full automatic hosiery machines, the HH half hose machine which makes the stocking complete automatically with the exception of closing the toe. There were four of these HH machines on display, ranging from the 3½-inch, 240-needle type to the coarse 4-inch gauge. Also shown were four RI machines, from 110 to 176 needle within cylinder. These machines introduce the full rib stocking and are called ribbed instep machines because, it is pointed out, they make a genuine rib all the way to the toe. One of these machines was set on plaiting silk over fiber and also for plaiting fiber over cotton producing a very desirable hose. A 240-needle, 3½-inch fine gauge K machine making a ladies' seamless stocking was in operation. One tipper making infants' goods and tipped infants' half hose was shown. The underwear machinery section of the exhibit included a standard underwear machine, 15-inch, 12-cut, eight-feed machine, together with a ⅝-inch, 40-needle, two-feed band machine. Representatives of the company were present to discuss matters with visitors.

J. W. Shardlow, 849 Highland Avenue, Needham, Mass., sole agent in the United States for William Spiers, Ltd., Leicester, England, had an operating exhibit. He showed the Autoswift machine, Model R, in fine gauges with plaiting attachments. The Spencer Purl machine for sweaters was on exhibit for the first time in this country. This is a new feature in circular automatic knitting machinery. A Joseph Stubbs, Ltd., backwinding machine with thread separating attachment was demonstrated. Mr. Shardlow, and Mr. Spiers and T. Harrington, of Leicester, were present.

Standard Trump Brothers Machine Co., Wilmington, Del., offered as a feature a "knocked-down" special demonstration machine in order to illustrate the working features and operation of the equipment. Among the operating exhibit were: a 16-inch, 14-cut Nye & Tredick automatic rib machine for underwear; a 2¼-inch, 120-needle,

Demanded by Leading Knitters!

Starting in a small way years ago producing a small quantity of knit goods, year by year increasing quantity and maintaining a high quality of production, a number of knit goods manufacturers have built up an enviable business and produce products whose trade-marks are known the world over as the highest standard of quality in fine knit goods.

Franklin Needle Makers are proud of the fact that Franklin Needles have helped them maintain their quality and quantity production, but rightly so because of the fact that as the pioneer manufacturers of latch needles, established nearly a half century ago, Franklin Needles were the selection of the pioneer knit goods manufacturers and have grown up with the knit goods trade.

Franklin Needles made by "bred in the bone" needle craftsmen of rare knowledge and experience, have the correctly designed head, the perfectly turned hook, the accurately shaped cheek, the free moving and solidly riveted latch, the smooth velvet finish and uniformity of temper, finish and dimension which assures long needle life and the production of high quality knit goods with fewer "seconds" and better and more "firsts."

It pays to fill the machine with Franklins

FRANKLIN NEEDLE CO. FRANKLIN, NEW HAMPSHIRE

Established 1874

LATCH TRADE FRANKLIN MARK **NEEDLES**

Reputation—
the best monument!
Centuries ago, an Egyptian King —the most powerful individual in the world at that time—called his wise men about him and commanded that they create something that would perpetuate his name forever. And the result of their deliberations is the Obelisk. We have forgotten the name of the king—and so has everybody else.
By way of contrast, the man who is useful needs no monument. The names of Watt, Stephenson, or Edison, for instance, will remain forever in the minds of the generations to come.
If, fifty years from today, it is said of us that we made the most efficient Latch Needles, it will be in our estimation a more enduring monument than anything that can be builded of stone or bronze.
There's a mighty difference between Good, Medium, and Bad. Just write us for samples and see for yourself.
Shamaey A. Williams,
MANCHESTER NEW HAMPSHIRE
Philadelphia Office:
121 N. Broad St.
THE
MADE IN U.S.A.
CAW
BY U.S.A. LABOR
BRAND
KNITTING NEEDLES

children's tipper, Standard hosiery machine; a 3½-inch, 220-needle half-hose machine, with sinker drop attachment; a 3½-inch, 184-needle, misses' machine with needle out attachment; a 3½-inch, 184-needle, ladies' machine, with sinker drop attachment; and a 3½-inch, 150-needle misses' machine with needle out attachment. F. H. Thomas, vice-president of the company, was in charge, and the other company representatives present were: W. L. Houseman, sales manager; H. E. Houseman, secretary; S. R. Shelmire, sales agent; A. W. Ehlert, and W. Frederick.

Tolhurst Machine Works, Troy, N. Y., featured in operation a 40-inch self-balancing direct motor-driven extractor, for the textile industry. This machine is constructed with a cast iron case, the basket made with a bronze top ring, perforated copper side sheet bound with wrought iron hoops, cast iron basket, bottom covered on inside with sheet copper and all inner copper surfaces of basket are tinned; the spindle being protected by a tinned copper tube. The machine is equipped with the recently perfected cast aluminum safety guard, and one of the special features is the construction of the machine which permits the use of a standard stock a.c. or d.c. motor instead of a high-starting torque type of motor, thus eliminating the need for a starting compensator or rheostat. W. C. Dutton, vice-president; R. K. Cheney, sales manager, T. M. Stuart, industrial engineer; J. W. Bird and Earl D. Rhodes were present during the week.

The Torrington Company, Torrington, Conn., exhibited through their representatives, the Manufacturers' Supplies Company, displaying samples of needles, etc. C. Rowe, H. Blake, L. Morgan, A. Kinkoski, P. S. Warner, C. A. Wigmore, J. Patchell, and W. Wiechardt were present during the week.

Universal Winding Company, Boston, in their exhibit, gave recognition to the prominence which artificial silk has achieved in knitting arts, showing three different types of machines especially adapted for the handling of this fiber. One machine shown handles the silk from the skein to the cone. This simplifies the operation and makes the handling of the fiber more economical, it was stated, than where wound first from skein to spool and then re-wound for knitting use. Also shown at the Universal booth was one of their super cone machines, with especial reference being given to heavy yarns of either worsted or cotton. These machines, it was pointed out, are especially adaptable in knitting mills where use is made of spring needle machines at high speeds and where a large supply of yarn is required to avoid frequent doffing. F. H. Bishop, vice-president, and Arthur I. Harvey, sales manager, were present, as were Frank J. Quinn, of the Philadelphia office; E. F. Broadbent, of Utica, and Frederick Jackson, of the southern office at Charlotte, N. C. C. H. Brown, Harold Jackson and St. Claire Burns were also in attendance.

Wildman Manufacturing Company, Norristown, Pa., were featuring their new full Jacquard circular machine, wherein the needles are individually controlled by a system of perforated paper patterns, for producing all kinds of fancy work for ladies sweaters, golf tops, etc. The J9, Jacquard control, four-color striper was also shown. Other equipment in operating display were: One 18-inch, 15-cut, 8-feed, style PB standard underwear machine, on cotton and silk; a Style PB-2, 8-feed, 8-color striper mechanism, for sport goods, for ribbed bathing suits, with half and full cardigan stitch; Style FDS-S, 34-needle, circular knit machine; the standard French welt rib top for hose; the footer, spring needle knitter, Style PH-3, for making fine web for ladies' silk, with attachment for high split double sole; and Style P-5, embodying the new four-color striper on hosiery ribber, with drop stitch attachment making fancy tops and infants' lines. Kenneth Howie, general manager, D. G. Bellas, F. E. Paul, E. S. Kennedy, J. J. Brennan, William McGonigal, and John Carr represented the company.

Chauncey A. Williams, Manchester, N. H., had as the feature of his display an illuminated panel in which his trade-make, "CAW" was formed, on a black background, of various types and sizes of needles which he manufactures. Samples of the various types of his product were demonstrated to visitors. Mr. Williams was present together with Lewis R. Unru, who recently was made manager of the Philadelphia office, and George L. Heaton, who formerly held this position but who has been transferred to the main office and factory as assistant to Mr. Williams.

Jacques Wolf & Company, Passaic, N. J., featured their line of Monopole oils, hydrosulphide, bleaching oil, Bensapole for scouring, cream softener, etc. An attractive reproduction of their works was illuminated and formed the center part of the display. Samples of products dyed and finished with the company's products were on exhibit. Dr. A. J. Pfister, president of the company, F. G. Henckel and A. J. Royce were present during the week.

Rodney Hunt Machine Company, Orange, N. J., were represented in the booth of the R. C. Jefferson Company, their representatives, who showed a model of their reel machine for bleaching, washing, scouring, dyeing and tinting knit underwear. Mr. Riggs, of the Hunt Company, was in attendance.

C. G. Sargent's Sons Corp., Graniteville, Mass., were also represented by the Jefferson exhibit. Photographs and blueprints of their wool washing and drying machinery and yarn conditioning machines were on display.

STATEMENT

of the ownership, management, circulation, etc., required by the act of Congress of August 24, 1912, of COTTON, published monthly at Dalton, Ga., for April 1st, 1924.

State of Georgia, County of Fulton.

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared W. J. Rooke, who, having been duly sworn according to law, deposes and says that he is the Business Manager of COTTON, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, W. R. C. Smith Publishing Co., Atlanta, Ga.; Editor, L. L. Arnold, Atlanta, Ga.; Business Manager, W. J. Rooke, Atlanta, Ga.

2. That the owners are: W. R. C. Smith, Atlanta, Ga.; E. P. Smith, Atlanta, Ga.; W. S. Cushion, Cleveland, O.; O. A. Sharpless, Atlanta, Ga.; J. C. Martin, Atlanta, Ga.; H. H. Kelley, Atlanta, Ga.; W. J. Rooke, Atlanta, Ga.; T. W. McAllister, Atlanta, Ga.; L. L. Arnold, Atlanta, Ga; W. O. Rogers, Atlanta, Ga.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or any other security holders are: None.

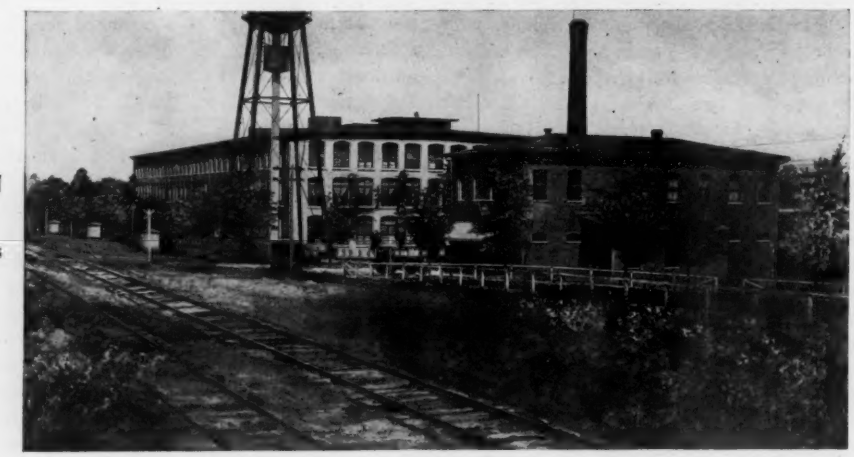
4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders as they apear upon the books of the company but also, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bonafide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. W. J. ROOKE, Bus. Mgr.

Sworn to and subscribed before me this 1st day of April, 1924.

(Seal) JOHN C. MARTIN, Notary Public.

My commission expires June 20, 1924.

CALHOUN MILLS
Print Cloths



CALHOUN FALLS, S. C.

The William Whitman Company, Inc., is interested in a number of mills in the South, and markets a large quantity of Southern textile products. The mills for which it acts as exclusive selling agents are:

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Tallapoosa Mills	Tallapoosa, Ga.
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Catherine Mills	Sylacauga, Ala.
Sycamore Mills	Sycamore, Ala.
Union Springs Mills	Eufaula, Ala.

WILLIAM WHITMAN COMPANY, INC.

Boston
New York
Philadelphia
Chicago
Amsterdam, N. Y.
Charlotte, N. C.

Wishes Some Underwear Costs.

EDITOR COTTON:

I am desirous of ascertaining the approximate cost on the following items entering into the manufacture of men's ribbed underwear, and will appreciate, through "Knitting Kinks," any information on same, listing cost separately or as a whole:

I desire the approximate labor cost in the manufacture of men's 13 and 16-pound garments; the approximate cost of trimmings; and the approximate cost of packing.

M. R. T. (Tenn.)

What Will Remove the "Curl?"

EDITOR COTTON:

I would be very much obliged if some of your readers would tell me, through "Knitting Kinks," if there is a patented device on the market for taking "curl" out of ladies' hosiery before it is hemmed. We have had trouble in this line and have been compelled to cut off as much as two inches before the stocking can be hemmed. Please give full information in replying. E. C. (Ill.)

Suggests Remedies for "H. C. K.'s" Troubles.

EDITOR COTTON:

I believe I can offer a few suggestions that will help "H. C. K. (Pa.)" out in his several difficulties experienced on his spring needle loop-wheel knitting machine, by which I understand him to mean a plain circular machine. I shall endeavor to answer the questions he asked in the "Knitting Kinks" section of the February issue.

Referring to the tucks which he says come in a vertical line and again tucks made at random, I would suggest that he make certain the wheels are landing the stitch so the presser will take it at the proper time. He will get a tuck effect also if he is not casting high enough in the beard of the needle.

Drop stitches will occur if he has a rough wing or blade on the wheel which makes the loop or stitch, or if he is handling a too lively or hard twist yarn, or a yarn not properly conditioned, a needle not crimped close enough, especially where he is not setting the yarn high enough in the beards of the needle. Any of these things mentioned will cause drop stitches, and he should try out one after the other until he has found the remedy.

Tight stitches off this type of machine may be caused by not having the bobbins properly in line with the loop or eye which guides the yarn from the bobbin. This may be determined by use of the plumb. Weak springs in the stitch wheel barrel will allow the wheel which forms the stitch to shorten or tighten the stitch by settling back while the machine is in motion.

Abnormal breaking of the beards of needles may be caused by too hard a press, or temper of the needle at the beard, or possibly not having the proper angle to the stitch wheel.

If the stitch wheels are properly set, I cannot understand why he should be bothered with the needles breaking at the beard. Keep the needles properly pliered to the circle of the cylinder and it will be a great help.

I should be pleased to learn if my suggestions have been of value, and if "H. C. K.," after giving them consideration and trial, still desires aid, let him send samples of his fabric, needles and further details and I will gladly go further into his problem. S. H. E. (Mass.)

We invite our readers to make use of this department for the discussion of any and all problems arising in connection with the knitting mill from the office to the packing and shipping departments. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. All questions will be answered as promptly as possible. The names and addresses of the contributors must be given, but will be held in confidence and a pen name substituted when printed. All accepted contributions other than questions will be paid for after publication. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Bleaching Knitted Cotton Fabric for Underwear.

EDITOR COTTON:

Replying to the six questions of "M. G." in COTTON regarding bleaching knit cotton fabric for underwear, I should say, in regard to the type of bleaching best suited for this, and I would suggest chlorine bleach either from chlorine of lime or soda, chloride of lime being the most economical. This bleach should always be followed with a good chlorine neutralizer so that there will be no tender goods.

As to the equipment necessary for handling 500 to 600 pounds of knit fabric per day, I would recommend: Open kier for boiling, rotary string machine, and dryer.

Yes, "M. G." can use the same equipment for dyeing. I think it better to use the one boil bleach if he is planning to turn out ecru and light shades.

Shrinkage can only be determined by practice, as much

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The use of good yarns in the manufacture of garments means much more to the ultimate consumer if the right process is used in the finishing of the fabric to bring out the best quality in appearance and leave the material in a condition to hold to proper size and shape throughout the life of the garment.

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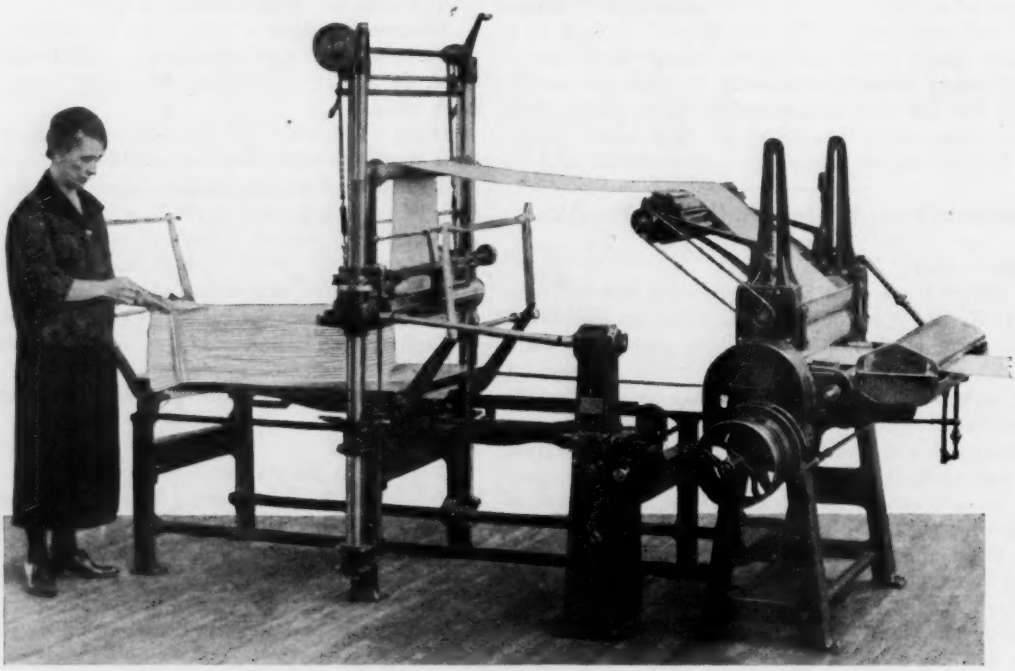

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depends upon time and slight variations of the process.

I should say that the cost per pound for bleaching this material would be about 2½ cents. I do not see why the installation of a bleaching plant on his goods would necessitate going on to a higher grade of goods.

J. A. B. (Pa.)

EDITOR COTTON:

In reply to "M. G.": Considering the fact that it is desired to bleach only from 500 to 600 pounds of fabric per day, it is our idea that the most economical method and the most satisfactory plan is that which is outlined below. (Please note that it is not our idea to specifically advertise any certain machine, manufacturer, or producer of chemicals and dyestuffs, but to make clear, names must be mentioned, and the costs given are subject to correction, being only estimates.)

Cylinder chlorine gas liquid as used in the best steam laundry wash rooms is the simplest and safest method for bleaching small lots of cotton knitted fabric the outlay for bleach materials is less, the equipment required is not great, the space need not be very large, and if proper care is exercised in handling the fabric and material there should be no spoilage whatever.

We would recommend 1 No. 6-6' Type P. Form M. R. Rodney Hunt wood drum reel machine or one of similar type, capacity 12 strings, present price of which complete is about $775.00; to this about $200.00 must be added to take care of freight and installation (concrete foundation must be laid under the floor level) and $150.00 for electric motor.

One 36-inch overhead individual motor drive extractor, present price of which is about $1,100.00, to which about $75.00 must be added to take care of freight and installation. This machine must set solid and be well attached to the floor.

One 500-gallon wooden tank for water with syphon tank regulator complete, installed with staging, piping, etc., about $900.00.

One blower exhaust system including 30-inch Sturtevant or other blower for bleach machine, motor driven with housing over machine, installed complete at about $350.00.

One set 4 Utica Drying Machine Co. Firschings vertical dry pipes, or similar, total cost about $300.00 to which about $75.00 should be added for freight and installation.

One set complete Buffalo Forge Co. or other 5 sections, 4 row heater with 55-inch steel plate pulley fan with housing and driven by 5 h.p. motor; cost about 700.00 to which should be added about $100.00 to cover freight and installation.

Two small cypress tanks, one 60 gallon steel tank, one large scale, one small grain scale, miscellaneous piping and fittings would bring the complete cost of such a bleach and dry installation to just about $5,000. The space required would be approximately 1500 square feet and while the work could be done nicely in the same buildings as used for knitting and finishing, it must be in a separate room, and entered through a quick sliding door.

The same equipment will take care of dyeing processes entirely, with one exception, it is not a safe policy to use the same machine for dyeing which is used for regular bleaching, and if it is desired to dye some of the fabric, say 100 to 150 pounds per day, a 4 or 6-string machine may be purchased for from $575.00 to $625.00 and the other equipment will be sufficient to handle the dyed fabric in addition to the bleached fabric.

The most satisfactory system (though there may be cheaper methods) of dyeing cotton fabrics, ecru or Egyptian shade, is the Autogyp process as practiced by the Surpass Chemical Company. This process eliminates the separate bleaching operation, and in one operation bleaches and dyes to any required shade. It is a simple process and easily taught to a willing man.

With the understanding that "M. G." is manufacturing low end children's garments, it is not then necessary to get a clear or pure white bleached fabric, and in this case there will be a shrinkage in fabric of 7 to 7¼ per cent. If he were making a high grade ladies' line, he would require a pure white bleach and in this instance the shrinkage would average 8 per cent and not less.

Webbing taken from a 15-inch knitting machine would lay up about 13 to 13¼ inches after the fabric had been bleached.

To operate this bleach house, including drying, it would require the services of one good man's full time, and a helper part of the time from another department, or an hour or two overtime. The cost of bleaching and drying per pound of fabric would be approximately as follows:

Direct or productive labor	.0125c
Overhead charges (250 percent of labor)	.0313c
Total materials	.0087c
	.0525c

.05¼c represents total cost of bleaching one pound of cotton fabric.

"M. G.'s" sixth question is not quite clear, but I would like to explain that I have never heard of any underwear mill being satisfied with its quality and service when the fabric is bleached by an outside party. The trouble and expense connected with carting to and from, length of time consumed, shortage, and spoiled fabric, in addition to the charges, leads me to believe absolutely that every underwear mill, large and small, high and low quality, should bleach its own fabric. In regard to the dyeing, it is not so necessary because many spinning mills now turn out very fine mock Egyptian shades of cotton yarns.

E. H. S. (Mass.)

EDITOR COTTON:

Replying to "M. G.," who asks the several question with regard to bleaching cotton knit underwear—

His first question asks which type of bleaching is most economical. The two main bleaches for cotton fabrics, of course, are chlorine and peroxide. The chemical cost of the former is less than the latter, but if a careful comparison is made of the two methods it will be found that the total cost of the peroxide process is about the same as chlorine; in many instances it is cheaper than chlorine. There is less labor required for peroxide than chlorine under most operating conditions which offsets the higher chemical cost. More material may be handled in proportion to the amount of capital invested in equipment with peroxide than with chemic since the boiling-out, souring, etc., are dispensed with. The fact that the peroxide process eliminates all acid treatment removes the danger of

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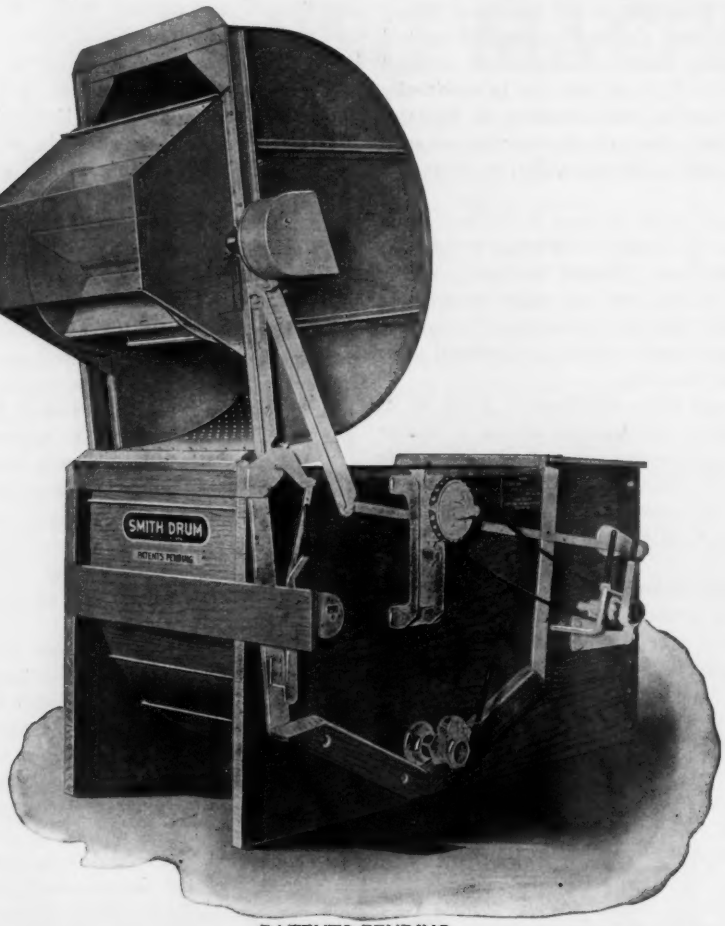

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insufficient washing causing damaged goods. Overbleaching is practically impossible since a peroxide bleach liquor is usually prepared so that all the available oxygen will be entirely consumed during the bleaching period. In fact, the writer believes that the amount of goods spoiled with peroxide will be negligible as compared to chlorine. The handling and pull on the fabric is also much less than where chemic is used.

As to the equipment necessary for handling 500 to 600 pounds of knit fabric per day—"M. G.'s" second question—this amount may be processed with chlorine by boiling-out in a reel machine and chemicking and souring therein or a small kier may be employed and the material boiled-out under pressure. Some firms in handling a small quantity of material arrange to do their boiling-out every two or three days instead of daily. This enables them to handle their work with a small kier to advantage. The souring, bleaching, etc., may be done as usual in a reel machine. The peroxide process can be carried out entirely in a reel machine, or if desired, the material may be bleached overnight in an open kettle and washed the next morning in a reel machine. For more definite information regarding the process I would suggest that "M. G." get in touch with the peroxide manufacturers.

A separate reel machine should be used for dyeing. Half bleaching may be done with peroxide in a half to three-quarters of an hour. This process should remove the specks, etc., and prepare the material satisfactory for dyeing ecru. If it is desired to dye and bleach in the one operation the Atuogyp process may be employed.

As to the shrinkage of a knit fabric, this depends upon several factors and I will not attempt to make a definite answer to this question as I have no data available. I would say, however, that a great deal depends upon the amount of pulling the material gets in processing as well as the knitting etc. The less the material is handled the better in bleaching.

When working on a small scale the cost per pound would be somewhat high. However, one man with a reel machine could turn out 600 pounds of material daily bleaching with peroxide by washing and blueing in the machine, or he could if desired use a kettle and bleach overnight and wash, blue and extract in the morning. The labor and chemical cost would probably be in the vicinity of one and a half cents a pound. The cost with chlorine would depend primarily upon the equipment used. Carrying out the entire process in the reel machine would be less than when working with the kier but the results would probably not be as good.

If a soft fabric and permanent white are desired we believe in handling a small quantity of work like this that the peroxide process would not only be fully as economical but would be safer and give a better fabric. We do not see why it would be necessary to go on to a higher grade of goods if "M. G.'s" trade calls for a bleached garment.

C. H. H. (N. J.)

A Question on Yarn Costs.

EDITOR COTTON:

I desire to know if there is any short method, which is approximately correct, whereby you can ascertain the cost per pound per number (manufacturing cost) where the poundage and average cost is given, on yarn; or where the poundage and total manufacturing cost is given.

For instance, if you have 300,000 pounds of yarn on which the total manufacturing cost is $30,000, and this lot of yarn is made up of numbers 4s to 20s inclusive—consecutive, 4s, 5s, 6s, 7s, etc.—15,000 pounds to each number, what is the cost per pound of each number, or the plus cost of each number over a 4s? M. V. F. (Ga.)

Waste and Shrinkage in Knitting.

EDITOR COTTON:

I am endeavoring to obtain constructive data in regard to shrinkage of cotton yarn while in transit from spinner to knitter, the true weight of cones and paper wrapped about cones and also the several shrinkages of yarn in winding and knitting operations.

I am told that some time in the past a very interesting article on this subject has been prepared and the paper was sent out to some knitting mills. I have never read it but believe it would be valuable to me.

Possibly "Knitting Kinks" can locate a copy of this article and rewrite the same in its columns. I am sure the article would be read by hundreds and be helpful to all.

I shall appreciate any efforts on your part.

Ben. (Mich.)

EDITOR COTTON:

Responding to the inquiry of "Ben. (Mich.)" which you forwarded to me, I take pleasure in furnishing herewith the gist of the report in question. I trust your readers will find it of interest.

Repeated tests in many mills, during which hundreds of cases of cotton yarn have been opened, show that the average cone and paper loss is actually 3½ per cent, instead of the 2 per cent cone allowance, or 1½ per cent loss which must be reckoned in our costs before the yarn is even removed from the case. This mentioned loss is a visible one and can be accurately measured by obtaining the weights of the different spinner's cones and wrapping papers.

The invisible loss due to the evaporation of the water in conditioning the yarn involves quite a little study in order to ascertain to any degree of certainty what this loss is, and few mills are careful enough in giving this item of shrinkage the proper consideration.

For instance, cases of yarn have been found (which have been in transit for long periods, say six to eight weeks in shipping from the South) to have shrunk 2, 2½ and as much as 3 per cent.

Cotton yarn when received at the knitting mill should be kept in a moist store house or basement, not so damp as to mildew or mould the yarn, but yarn kept right will retain much of the necessary conditioning, and run much better on the winders and knitters; on the other hand yarn kept in bone dry store-houses, will be found dry and brittle and will run very poorly on winders and knitters, thereby increasing the waste from these operations.

Natural conditions, particularly humidity, have much to do with the amount of drying out that takes place in yarn, but much of this can be overcome and dollars saved

by looking well into the store-house which contains your cases of yarn.

From and during the operation of winding yarn from cones to bobbins, we have waste, respectively, fly, hard ends, unnecessary waste of operator tying ends, the last few windings on cones when ends break down (which operator pulls off and puts in her pocket) comprehensive study and tests have shown this waste to average between 1 per cent and 2¼ per cent, varying according to the mill and the condition and quality of yarn being wound. I believe a mill should use 1½ per cent in finding their costs.

From and during the operation of knitting we have waste, fly, hard ends, the tying of ends, yarn unconsciously pulled off before tying of ends after break down and yarn cleaned off of bobbins when near the bottom, (the latter waste is a very bad one and this waste alone can increase the knitting loss tremendously) the average loss of yarn during the knitting operation in a carefully controlled mill should be 1¾ per cent and this figure used in finding costs.

Summing up these several shrinkages and wastes as outlined, we have cone and paper

Over the 2 per cent allowance, loss 1½ per cent
Evaporation loss 2 per cent
Winding operation loss 1½ per cent
Knitting loss 1¾ per cent
Total loss 6¾ per cent

Therefore, to produce 100 pounds of knitted fabric it is necessary in purchasing yarn to cover for this percentage of loss or waste and I suggest that the purchase amount be determined in the following fashion:

100 — 6¾ = 93¼ per cent. Then 100 pounds = 107¼ pounds of yarn required to be purchased to knit 100 pounds of fabric.

Probably you would be interested further in facts and figures relative to losses after the cloth is knitted, namely, in the bleaching and cutting departments.

The losses in bleaching vary as to the method of operation, nature of bleach used and whiteness of fabric arrived at. Where a clear white is desired and the shrinkage in weight of fabric before and after varies from 6 per cent to 9 per cent, the average loss being 7 per cent and where weight of garments are determined for costs purposes after fabric has been bleached, we suggest that 7 per cent is the figure which should be used in finding out costs.

In the cutting department we have wastes which are necessary and wastes which are not necessary and in this department alone, proper use of the shears and careful control and supervision has saved many thousands of dollars in individual mills in a single year.

Waste fabric in the cutting room varies according to type of garments being cut, the waste will not be as great on infants' and children's garments as on women's or men's union suits and it is of the latter manufacture that we have the most reliable records, (these records taken daily for a period of years); the cutting room waste will average 14 per cent, and we would suggest to mills determining their costs from net weights of garments after being cut and ready for seaming operations that the combined losses as enumerated below, be considered in finding costs.

6¾ per cent loss up to and including the knitting.
7 per cent loss in bleaching.
14 per cent loss in cutting.
27¾ per cent total loss.

Therefore, to produce 100 pounds of cut garments (ready for the first sewing operation), it is necessary in purchasing yarn to cover for this percentage of waste and we suggest that the purchase amount be determined in the following fashion:

100 — 27¾ = 72¼ per cent. Then 100 pounds = 138¼ pounds of yarn required to be purchased to produce 100 pounds of cut garments.

In other words if you purchased and paid for 100 pounds of yarn on the 2 per cent cone allowance basis and you wound and knitted this yarn into fabric and bleached the fabric and then cut it into garments, it is contended that these finished cut garments would weigh approximately 72¼ pounds.

E. H. S. (Mass.)

The Yarn Market.

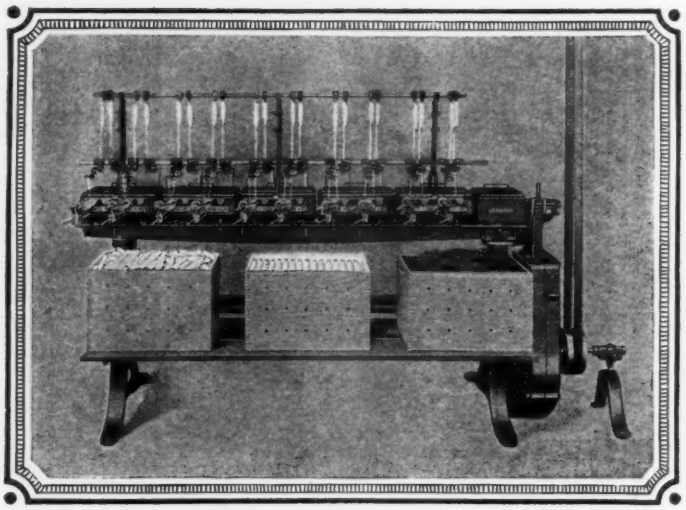
The feature of the Philadelphia cotton yarn market for the past month, as reported here, has been a very noticeable elevation in quotations on practically every count of yarn involved in the transactions of the market. During the second week in April, as an instance, prices were boosted healthfully, the most marked increase being seen in carded yarns for weaving, to be followed by carded knitting yarns, with the combed yarn people afterward bringing their own quotations to the higher levels established by the carded yarn men.

During this particular week the weaving yarns were boosted something like a nickel, while the knitting yarns gained two or three cents as did the combed numbers. The upward movement during the week mentioned was exceptional, in fact, it was reported to represent the widest price change since the Fall of 1923 when yarns took such a rush upward along with raw cotton which attained a high peak. The effect of the elevations, however, was to overcome any depressions in the list as published, with the result that the list given in these columns this month shows the various counts to be on a somewhat higher plane than on the date represented by the list appearing here last month. As examples: Two-ply skeins, 30s, were given here at 49 cents last month as of March 14th. On April 17th, 52 cents was asked for this count. 30s two-ply warps went up four cents over the same period to an asking price of 54 cents on the latter date. The recovery in combed numbers was not so good, yet on April 17th, 60s/2 combed peeler skeins and warps showed a rate of 85 cents as against 82½ cents on the 14th of March.

These quotation advances were the cause for considerable optimism expressed by a number of yarn dealers as indicating a prospect for better times ahead in the market. They felt the time was nearer when the spinners could operate with much more of the difference between their cost and their lower selling price wiped out, and possibly might be able to dispose of their yarns at profit once more.

The rise in price, however, seemed to have very little effect one way or the other upon the yarn consuming division of the industry. During the recent times of depressed rates and paucity of business the users seemed to have de-

(*Continued on page* 785.)



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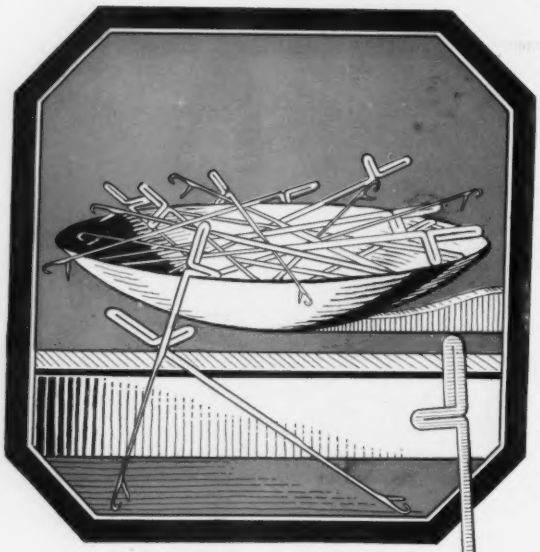

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The Knit Goods Market

A brisk market for hosiery of silk and silk in various combinations marked the beginning of the spring season. Novelties in cotton and mercerized were in good demand. Cheap staples in combed and carded continued draggy last month. The price trend was downward in spite of higher or sustained cost of fundamental raw materials, and additional curtailment of output was resorted to for averting more disastrous breaks in market value.

Operations in underwear by jobbers were in a much restricted way. It is doubtful whether any recent year witnessed a parallel of the situation as it appeared in April. Distributors were buying ultra-conservatively of summer weights and were leaving their commitments for winter goods to a later day, in the hope mills would be able to name lower than existing prices. Manufacturers were almost a unit in adhering to established quotations and had warrant for this attitude in the bulge in cotton.

Business in sweaters and knitted outerwear generally was about on a parity with that in underwear. Jobbers were not ready to place repeat orders, of which most mills stood in need. Improvement in knit goods was confined almost exclusively to hosiery, with mill conditions in this division still unsatisfactory.

A beginning of what may be regarded heroic treatment for remedying textile market conditions was seen in the determination of manufacturers in various lines—more especially in piece goods—to bring prices down to a workable basis through reduction of operating cost, and relieve the goods congestion by holding production in check for a time.

Competition among manufacturers never was keener. Sizable orders for goods were obtainable, but at prices which showed little or no margin of profit for mills. The only element in which there was no competition was that of organized labor. In one textile manufacturing line there was presented to employers a demand for a 40-hour week, a "more adequate" minimum wage, guaranteed number of weeks employment during the year and use of the union label. In another textile industry division announcements of a cut of 20 per cent in wages were made, followed by a declaration to oppose it by strike. It appeared that efforts to adjust cost conditions were at last under way. The battle will be between the consuming public and the factors that have brought about the inequitable situation in industry. If the public will pay the price for essentials as willingly as it does luxuries, the obstructing factors will have their way. If not, they will have to yield. Business in textiles is on the threshold of happenings for its betterment.

Southern manufacturers attending the knitting arts exhibition last month estimated that mills in the South making plain cotton hosiery were, as a whole, operating an average of four days a week, while those producing silk and artificial silk goods were running to near capacity and apparently well supplied with orders.

The estimate as to the cotton hosiery mills appears quite liberal, in view of the opinion of manufacturers in Reading, Pa., that mills in that city were down to less than 50 per cent of capacity production, notwithstanding several making full fashioned hosiery were known to be busily engaged, after having been materially enlarged. In Philadelphia the manufacture of coarse gauge cotton hosiery has become a near approach to a lost art. Manufacturers of fine gauge are working on orders for nearby deliveries.

Conditions among silk hosiery mills in Philadelphia are singularly spotty. For example, a mill making ladies' seamless stockings in straight silk and fiber and the two in combination is and for some weeks has been under pressure for deliveries, and last month was in the market for additional Banner machines. A larger establishment, equally well known in the trade, was not operating the seamless machines, while being pushed with orders for full fashioned. The William Brown Company, full fashioned, selling to retailers, is enlarging the factory and installing additional machinery. In a general way mills, whether selling to jobbers or retailers, are comfortably situated as relates to ladies' silk hosiery, with those dealing with retailers direct appearing to "hold the better hand" so far as high grade mercerized and combed staples are concerned.

The Berkshire Knitting Mills, Reading, Pa., gave the silk hosiery primary market something of a jolt when, about the beginning of April, they came out with the lowest price for full fashioned since the wartime advance, naming $12.60 a dozen for 39 gauge 20-inch boot, to jobbers. As department stores buying quantity lots are given the same price, it is apparent a standard full fashioned silk stocking is made available at $1.50 a pair, in contrast with $2 as the popular price a year ago. The stocking probably will be used by retailers other than department stores as a $1.59 special. It is stated the Berkshire sold up its production of this number ten days after opening, deliveries to commence July 1 and run through the remainder of the year.

The Berkshire company is operating 500 full fashioned machines, comparing with 160 in 1915. At that time the Oakbrook Hosiery Mills, also in Reading, was making no full fashioned goods. The company last year had 38 machines and recently installed twelve more. The Nolde & Horst Co. has doubled its equipment since 1915, when there were but two full fashioned mills in Reading. Now there are ten. Philadelphia has 66 such mills, according to a directory of the knitting trades, a gain of 43 in eight years. The South is credited with 13. A recently published estimate, which leading manufacturers declare to be not exaggerated, is that the combined output of the full fashioned silk hosiery mills of the United States, if operating to capacity, would be approximately 100,000,000 pairs a year. That there has been a very large increase in the output of seamless silk hosiery is indicated in a showing of a total of 365 mills—full fashioned and seamless—in contrast with 165 in 1915. The figures are a sufficient explanation for the lessened sales of cotton hosiery and the gradual disappearance of coarse gauge mills from Philadelphia and adjacent territory. Lower prices of the silk are likely to make further inroads on the cotton hosiery industry this year.

Several of the well established manufacturers in the South, while not turning their attention to silk hosiery, are discontinuing the production of coarse gauge goods for

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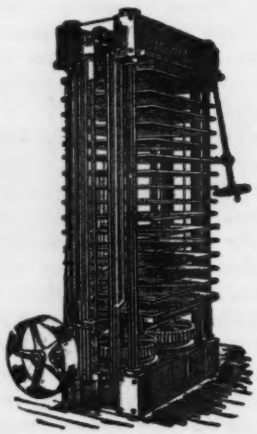

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fine gauge and novelties in carded. In the latter class is a misses' carded dropstitch, in five colors, to sell in retail stores at 19 cents a pair. Another mill, formerly specializing in coarse gauge 28-ounce ribs for misses, and recently discarding them, is turning off heather ribs of cotton and wool in combination, and contracts on the books assure steady operation for several months. The plain ribs, combed and carded, perhaps never faced competition so keen as this year. Carded, quoted by some manufacturers at $1.05 a dozen, rise 7½ cents and fall five, have been offered by a few at an even dollar, rise and fall five cents. One mill selling at this price got into financial difficulties from which, it is doubtful, it can emerge.

It seems not improbable that silk hosiery is or soon will be overproduced to the extent as was low end cotton goods. Rivalry between the full fashioned and seamless promises to be sharp and determined. Thus far the lower cost of the seamless has been in its favor, and so long as an appreciable gap between the two divisions in the matter of production cost can be maintained the full fashioned will be found on the side of the offensive. Seamless manufacturers say this spread is in no danger of narrowing, and that instead of making lower cost the objective, the aim will be toward such improvements in construction of the seamless as will make it a still more formidable competitor of the fashioned.

That dealers were able to acquire distress goods in silk hosiery lines was indicated in some of the April special sales of department stores. Tram boot seamless were sold by two establishments at 74 cents a pair for firsts, and tram and artificial silk in combination as low as 65 cents. Standard boot full fashioned were exploited at $1.45 to $1.50 a pair. The sales seem to have been staged for forcing the Easter buying, and no doubt were hastened by anticipations of lower priced hosiery coming out from some of the full fashioned manufacturers. It was observed that there was no forced selling of cotton hosiery, very little mention being made of even the lagging mercerized.

Mercerized hosiery ribbed from top to toe is coming out in so increased volume that it would appear the plain is due for continued antagonism. Several attractive mill lines of the ribbed are free sellers, at materially lower prices than manufacturers first in the field were getting; in fact, some quotations are so low that a few manufacturers who contemplated making the ribbed have abandoned their plans. A ribbed toe half hose of artificial silk plated on mercerized has been going to retailers as a 75-cent-a-pair leader in high grade processed cotton lines. It proved a profitable product for the mills which were among the first to put it on the market. It is predicted ribbed-to-toe half hose of wool combination will be conspicuous among offerings for next winter.

Well made combed half hose is holding its ground in competition with low end mercerized, no recession of moment coming out. Low end carded goods for men and women are in better demand, relatively, for export than for the domestic markets. Cuba again is a big buyer of cotton hosiery, taking from 70,000 to 85,000 dozens a month, which represents about twice the shipments to Canada and almost three times the quantities invoiced for accounts in England. A Philadelphia export broker is desirous of establishing a connection with manufacturers of low end mercerized and carded hosiery, and is in the market also for seamless silk for ladies, one request being for self-clocking goods. Exports of cotton hosiery now are on a monthly basis of about one-third of what foreign markets were taking in 1920, the banner year for overseas business in such lines.

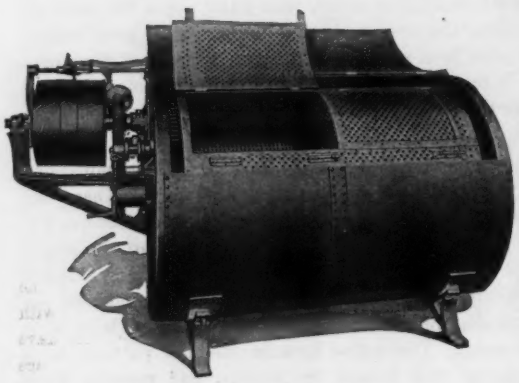
Ladies' fiber silk hosiery in bright colors has been in good inquiry since prices of artificial silk were reduced in February. One of the better lines is sold in retail stores at 75 cents a pair, but jobbers are able to buy other lines at $3.07½ to $3.25 a dozen, with $3.50 about the price of better than the average in the 50-cent retail price range. There have been substantial gains in exports of fiber hosiery. It may be noteworthy that exports of cotton hosiery are on the increase along with imports of cotton piece goods.

It develops that there still are some mill accumulations of infants' socks of average mercerized lines. There has been a falling off in duplicate business from jobbers, but a few are placing small repeat orders. One of the larger jobbers who in March bought 15,000 dozens and thought these would be sufficient for meeting the remainder of the season's requirements came back a few weeks later with a like order. Distinctive lines in the new patterns have been pretty well bought by jobbers, and recently there came inquiries for infants' dropstitch socks. In view of the number of innovations last year distributors were fearful of the drop stitch and changed orders to other numbers. They reasoned that in the event of being left with carry-over stock and, anticipating additional new designs this year, the established patterns would be a safer asset. After mills discontinued making the dropstitch jobbers came into the market for it, and found practically none. Manufacturers with stock goods were able to command prices representative of value.

Seamless mills have a strong grip in the market for half hose, particularly in silk lines to go over the counter at 75 cents a pair and down, comparing with one dollar to $1.25 for the full fashioned. Equally strong numbers in most communities are tram and fiber in combination and fiber plated on mercerized, with straight fiber also popular. An imitation of the ribbed-to-toe half hose was given a first showing recently. The stocking was of artificial silk on mercerized, knitted plain, and printed to simulate the dropstitch. Price and appearance make it attractive as a sales proposition, but it is a question whether the innovation can have more than a short-lived existence. It seems certain not many manufacturers will attempt it.

While there was a revival of activity in the hosiery primary market in April, it was believed industrial conditions generally were pointing toward a short lull following fairly good buying for late spring and early summer, and that it would be a mistake to speed up production on the strength of the spurt. In any event, it is improbable distributors will depart from the policy of buying for covering sales instead of for stock. While there is likelihood of continued good call for spot goods, manufacturing for stock, in anticipation of prices being maintained, would be fraught with no less danger than prior to the severe curtailment of the last few months, with accumulations of low end cotton hosiery being offered at as low as one dollar a dozen, basis of carded half hose of 144 and 176 needles, full seamless; women's 220 needle mercerized at $2 a dozen from stock and a distress lot of 240 needle mercerized half hose

ROME
DYEING MACHINE



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Prices obtained in such transactions do not make a market, but the state of the market makes the prices, and the current state calls for a more complete balance of output with distribution. The aphorism "The tail wagging the dog" is having an exemplification in the dominating influence of the retailer on the manufacturer, a more forceful one in relation to underwear than hosiery.

Retailer buying of underwear for spring and summer has been on so restricted a basis that jobbers not only are placing few repeat orders for light weights, but find justification in making no further contracts for winter garments. Prices of summer weights softened slightly when cotton was at the low for this year, and had the effect of a better jobber interest. Subsequently there was a virtual return to former schedules and interest waned. A revival is to be expected during May, and by the middle of June mills selling to jobbers will have about finished their season.

There was some buying of men's bal briggans and ribbed summer underwear in April, but it was done in a quiet way, and if the truth were known it probably could be said that wholesalers by this time are pretty well covered for their summer requirements. Those who have not will be looking for goods, and they probably will pay more than if they had taken advantage of the March offerings of mills. Of women's underwear there will be no scarcity.

Not in a long time has the women's underwear industry in interior Pennsylvania been so close to complete stoppage as it was last month. Many mills were idle, and those in operation were producing, on an average, less than one-half of capacity output, according to several mill executives in the upper reaches of the Schuylkill Valley. All had overestimated demand and, apparently, had overlooked the trend toward silk garments and the more widespread use of artificial silk in combination with cotton. And last month came formal announcement of a strong line of men's knitted underwear made of cotton and artificial silk coming on the market. It will be sold direct to retailers by the Phoenix company, Milwaukee, and already has been placed in a number of stores in several of the larger cities.

This is a more significant step in the knitting trades than seems apparent at first glance, marking as it does invasion of the underwear field by Milwaukee hosiery mills selling to retailers. A year or two ago the Munsingwear company, manufacturers of underwear sold direct to retail stores, engaged in the production of full fashioned silk hosiery, acquiring a control of a mill in Fort Wayne, Ind., subsequently taking over the plant of the Rockland Hosiery Co., in Philadelphia. The Munsingwear Co. probably was the first of the direct selling underwear establishments to add silk hosiery to its line, and may have supplied the inspiration for the Phoenix hosiery company to knit and sell underwear.

This combining of the manufacture of two distinct products under one executive management is in line with the move toward centralizing for bringing overhead down to a minimum, more pronounced since the dawn of a new era of keen competition. Obviously, the selling cost is materially reduced and there are economies in various directions. It should work out well for manufacturers of nationally known branded lines.

Going further into the significance of the Phoenix enterprise, this company is among the pioneers in the use of artificial silk as a component part of men's knitted underwear. For the present the company will make shirts only in the combination, but it is expected union suits will be added. This opens a new rival for the nainsook athletic garments, which had become so widely popular that knitting interests, as a matter of self-preservation, about two years ago launched a somewhat formidable advertising campaign. Looking still further, the innovation—for such it must be regarded just now—will give manufacturers of men's bal briggan and cotton ribbed underwear another element with which to reckon. It is coming to be rather difficult for the backwoods manufacturer to keep pace with the large industrial centers.

In view of slack conditions in ladies' underwear, a manufacturer in a small city in interior Pennsylvania discontinued making such lines and diverted his plant to the production of men's light weight garments, a field which already was well covered. He might have fared better had he gone a step further and done what the Phoenix company is doing—combine cotton with artificial silk. He then would have been a pace ahead; as matters stand he is a pace in the rear.

Heavy weight underwear has so much with which to contend that it is fortunate it offers a narrower field for changes in style and fabric. Those southern manufacturers who more than six months ago began selling for next winter, deliveries beginning in February last, are conceded to be comfortably situated as to business. Their sales were chiefly sub-standard lines. It is the opinion of some jobbers that, because of the radical advances in prices of standard goods from last year's level there will be a larger retailer call for the cheaper garments, as a means for escaping sharp departures from their price ranges. Either that, jobbers say, or the substituting of lighter weight garments. The 16-pound cotton ribbed suit, if bought now, would cost them from $2 to $2.50 a dozen more than the 1923 price. Jobbers would pay for it about what they got for this weight suit a year ago. Retailers would add 25 to 50 cents a garment.

As for some time the consuming public has been buying less of the heavy and more of the light weight underwear it is reasoned in the trade that retailers would have little difficulty in further popularizing the 12 and 14-pound suits, especially in view of increased costs. The 12-pound suit now is being quite extensively used in communities where only a few years ago the 16 was as staple as sugar in a grocery store. It is easily within the range of probability that price will play an important part as a factor in a diminished use of the very heavy garments except by certain classes.

Jobbers were led to believe in March that eventually manufacturers of winter underwear would offer recessions from their established prices. There was no incentive at that time to contract for goods, and the intimations they received supplied encouragement for deferring commitments. The hope for downward price revisions reached the vanishing point last month, when cotton again soared to near the level where current underwear prices had been fixed.

The April cotton movement is viewed in the light of a turn favorable to manufacturers. It served to vindicate determination to put it up to distributors to either pay value or go through the season with not enough underwear

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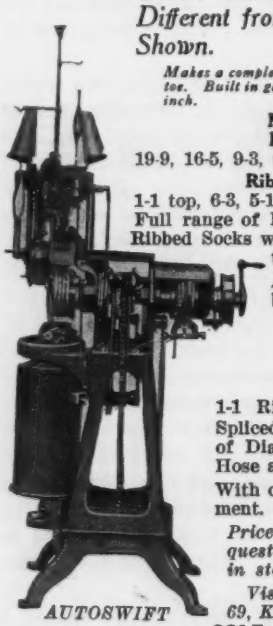

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Ribbed Hose
19-9, 16-5, 9-3, 6-6 White Plain Toe.
Ribbed Half Hose
1-1 top, 6-3, 5-1 or 3-1 leg.
Full range of Diameters for ¾-Hose and Ribbed Socks with or without plaiting attachment.
Any rib which divides can be made.

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to meet requirements. Furthermore, it discouraged cancellation of orders, numbers of which were looked on as in danger when cotton got down to 26 cents and thereabout. Manufacturers who sold subject to guarantee of prices against declines of their own were especially benefited by the stronger position of cotton. Had cotton not come back and business continued to lag, there is no doubt some one manufacturer or another would have offered reductions, and price competition would have resulted, and in consequence buyers would have held mills to their guarantee or cancelled orders. High price cotton may be working a hardship for some interests, but undeniably it has helped others.

The bulk of next winter's underwear going through jobber's remains to be contracted for. Most of it will be bought late. Jobbers say they really do not need deliveries before September and that therefore they will be safe in placing orders as late as June or July. Whether they are correct in this conjecture will depend on the willingness of mills to accumulate stock or, pursuing the other alternative, decide to hold production down to current orders. At the moment it does not look as though jobbers have gained anything more than time by waiting. Having held their ground since December, manufacturers may be expected to stand pat for another long period. It is not being overlooked that if distributors and retailers were willing to operate on as narrow a margin as they grudgingly accord to manufacturers, prices to the consuming public would need be very little, if any, higher next winter than last winter.

According to a rumor current in the trade a New York State underwear manufacturer, taking a cue from the jobbers who predicted a retailer preference for the sub-standard heavy weights as a price expedient, is making a 12-pound garment, somewhat cheapened, to sell to jobbers at $12.50 a dozen. While this may be viewed as more sensible than reducing prices of standard lines and precipitating new competition, it is questioned whether the undertaking will not invite more formidable rivalry from southern manufacturers, who have an advantage in lower production cost.

In the sweater trades there is an outward appearance of adhering to primary market prices. Selling pressure, though, was productive of a softening. Mills are in need of business for averting a shutdown during a part of the summer, the time when they should be busy on orders for deliveries in September. There has been a weakening in prices for several months, but no radical cuts. Manufacturers have had conferences with yarn interests in the hope of a sort of cooperation by which the quiet situation might be given some life. But prices of yarn—cotton and worsted—are lower, relatively, than those of knitted outerwear, of which more is being produced than the trade is ready to absorb.

Worsted yarn spinners seem to have been driven to the last ditch in the matter of price revision, and a number are operating on a basis of less than 50 per cent of spindle capacity. Further curtailment was looked for at last accounts. A tightening in yarns seems more likely than easier prices, unless wool, still ruling strong, although being contracted for in a much restricted way, shall weaken materially.

Among the Knitting Mills.

The Fuller Hosiery Mills, Carrollton, Ga., have started installation of machinery for manufacturing women's high grade seamless hosiery. W. T. Fuller is manager of the plant.

A site has been purchased at Pikeville, Tenn., by the McAllester Hosiery Mills, of Chattanooga, for the erection of a branch mill with a capacity of 500 dozen pairs of misses' and children's mercerized hose. For the present the plant will be devoted to knitting and looping, the product being finished at Chattanooga.

The Carter-Collier Co., Macon, Ga., has installed 42 additional sewing machines.

Freeze-Bacon Hosiery Mills, Hendersonville, N. C., are planning for the installation of oil-burning equipment in their power house to replace coal fuel.

Contract has been let for the erection of a two-story brick and concrete addition to the plant of the B. J. Priester Hosiery Mills, at Paducah, Ky. The enlargement will provide additional floor space for new equipment.

Magnolia Hosiery Mills, Gulfport, Miss., have been incorporated by L. M. Russell and others and a site secured for the erection of a building.

California Hosiery Mills, Inc., Los Angeles, Calif., have acquired the Howard Hose & Garter Co.'s plant, and a number of new units will be constructed.

The Glove Knitting Co., Boston, Mass., has added 10,000 square feet of floor space to its mill.

William Rees, Scranton, Pa., and associates, have acquired the plant of the K. L. B. Knitting Mills, West Pittston, Pa.

The Variety Knitting Mills, Brooklyn, N. Y., recently organized with a capital of $15,000, will operate a local plant. The new company is headed by S. Hirshman and M. Thorner; it is represented by L. X. Alter, 50 Pine Street, New York.

The Hingham Knitting Co., Cambridge, Mass., is perfecting plans for enlargements in its plant, and will install additional equipment, including ribbers, etc.

The Roselle Knitting Mills, Brooklyn, N. Y., will operate a local plant for the manufacture of a line of knit goods. The company was organized recently by D. and L. Lippman. It is represented by Weissman & Rapps, 186 Joralemon Street, Brooklyn.

J. J. Steinberg & Co., New York, N. Y., have arranged for a change of name to the Atlantic City Knitting Co., Inc. Plans are under way for extensions.

The S. B. S. Knitting Co., Reading, Pa., has purchased a mill at Leesport, Pa., previously occupied by the Burkey Underwear Co., Inc., and will take immediate possession. Plans are under way for the early occupancy of the plant for the production of a line of knit goods. Improvements will be made.

The Savoy Knitting Mills, Inc., 29 East Nineteenth Street, New York, N. Y., has arranged for an increase in capital from $55,000 to $105,000, to provide for proposed increase in production.

The Vane Knitting Mills, 79 Prince Street, Newark, N. J., have filed notice of organization with the company headed by Irwin Vaxler, 22 Goodwin Avenue. Plans are under way for the operation of a local mill.

The Argyle Knitting Mills, New York, N. Y., recently

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Smooth-running machines and smooth-tempered operatives go a long way in producing more and better products and increased profits.

Equip those knitting machines with Granite State Needles and watch the production chart. Don't forget to watch that profit line rise also. You can't miss it.

Where shall we send samples? Advise us.

GRANITE STATE
NEEDLE CO.
LACONIA
N. H.

formed under state laws, will operate a plant in Queens Borough. The new company is headed by J. A. Radeloff and Meyer Radeloff, 356 Fulton Street, Brooklyn, N. Y.

The Windsor Knitting Mills, Shillington, Pa., recently formed with a capital of $50,000, have plans for the operation of a local plant. It is proposed to develop large capacity at an early date. Charles G. Mosser is treasurer of the new organization.

The Endurance Knitting Co., 225 West Wyoming Street, Philadelphia, Pa., has work in progress on a new one-story addition for general increase in output.

The Specialty Knit Goods Mfg. Co., 93 Underhill Avenue, Brooklyn, N. Y., has arranged for an increase in capital from $10,000 to $100,000. Arrangements have been made for a change of company name to the Specialty Angora Mills, Inc., with production to continue in the general line of knit goods as heretofore.

The Revlis Knit Goods Co., Brooklyn, N. Y., recently organized, will operate a local mill. The company is headed by S. E. Merriam and B. D. Vinegrad; it is represented by I. W. Weisman, 261 Broadway, New York.

The Gold Knitting Mill, 526 Jane Street, West Hoboken, N. J., has filed notice of company organization, and will operate a local mill for the manufacture of a line of knit goods. The new company is headed by Samuel Jacoby.

H. W. Anthony, Inc., recently organized by H. W. Anthony, Strausstown, Pa., and associates, is making ready for operations at its new plant at Harrisburg, Pa., heretofore occupied by the El-Knit Co. The new owner has made a number of improvements, and will devote production to a line of hosiery. Preliminary plans are under advisement for enlargements in the local plant, to be carried out at an early date. James J. Gallagher is president of the new corporation.

The Eastern Knitting Mills, 1083 Willoughby Avenue, Brooklyn, N. Y., have been making enlargements in their plant with the installation of additional equipment and plan to develop maximum capacity in the line of knitted sportwear specialties.

The J. Milton Ross Industrial School, 1101 Hibernian Building, Los Angeles, Cal., plans for the purchase of knitting machinery for installation in its school department devoted to textile work, to be used for the production of hosiery and other knit goods.

The Rodgers Hosiery Co., Wyoming Street, Philadelphia, Pa., has secured a permit for the construction of a new addition to its plant, to cost approximately $50,000. A list of equipment to be installed will soon be arranged.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., have issued a color card on their Sulfogene colors for cotton rawstock. The Sulphogene colors, a series of sulphur dyestuffs, the company states, are extensively used in all types of machines because they are in general very soluble and dye very evenly. In a great many instances the fastness to light washing and storing can be improved by aftertreatment with copper, chrome and acetic acid. Instructions for dyeing are included on the card.

We all make mistakes. It is the overseer or superintendent who profits (that is, learns something) by his mistake who beats the other fellow.

The Yarn Market.

(*Continued from page 774.*)

cided very definitely to operate upon a plan of buying for orders on hand and as secured. In fact, instances were pointed out to show that whereas in other times the consumer might be influenced to exceed his established buying quota by the appearance of what seemed a bargain in a larger lot, such offerings seem to have no attraction for him at the present time.

It was very evident, therefore, that increased interest from the buying end was not responsible for the higher quotations, and it was explained that the sudden and noticeable jumps taken in the price of the raw staple were doubtless the cause for the firmer attitude on the part of the spinners. Furthermore, it was pointed out, especially during the first part of the month, that the elevated rates represented spinners' asking prices rather than the quotations upon which sales were made in the market.

Also evident during the month was quite a marked irregularity in spinners' prices, especially at the higher levels. It was felt that the influence of the unified action of spinners in the Southern Yarn Spinners' Association would be exerted in this direction with good result, and it was a general feeling in the market that the reorganization of this body of spinners, with its projected purposes, was of good omen for the industry as a whole.

Following are quotations on the Philadelphia market on April 17:

Single Skeins.

4s to 8s	42	10s	43½
12s	44	14s	44½
16s	45	20s	46
24s	48	26s	49
30s	51		

Single Warps.

8s	44½	10s	45
12s	45½	14s	46
16s	46½	20s	47
26s	50	30s	52 @53
40s	60		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	43
8 3-4 tinged tubes	39
8 3-4 hard white warp-twist	41
8 3-4 hard twist waste	38

Two-Ply Skeins.

8s	43½	10s	44
12s	44½	14s	45½
16s	46	20s	47
24s	49	26s	50
30s	52 @53	40s	59 @60

Two-Ply Warps.

8s	45	10s	45½
12s	46	14s	46½
16s	47	20s	48
24s	50	26s	51
30s	53 @54	40s	61 @62

Frame Spun Carded Yarn on Cones.

8s	42½	10s	43
12s	43½	14s	44
16s	44½	18s	45½
20s	46	22s	46½
24s	47½	26s	48½
30s	50	40s	59
30s double carded			51
30s tying-in			48

Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	61	20s	63
24s	65	30s	68
40s	75	50s	80
60s	85	70s	95 @1.00
80s	1.10 @1.15		

Mule Spun Carded Yarn on Cones.

10s	46	12s	47
14s	48	16s	48½
18s	49	20s	50
24s	52	26s	54
30s	57	40s	64

Mule Spun Combed Peeler Yarn on Cones.

10s	53	12s	54
14s	55	16s	56
18s	57	20s	58
22s	59	26s	64
28s	65	30s	66
36s	68	38s	72
40s	74		

James D. Hammett.

The death of James D. Hammett on April 15th removed from the southern textile industry one of its beloved personalities, a capable executive, and a leader in every important movement tending toward the betterment of the industry and the welfare of its operatives.

Mr. Hammett died suddenly on Tuesday night at his home in Anderson, S. C., and was buried in Silverbrook Cemetery, on Thursday.

James David Hammett, at the time of his death, was president and treasurer of the Orr Cotton Mills, at Anderson, and the Chiquola Manufacturing Company, at Honea Path, S. C. For the last several years he had been president of the Cotton Manufacturers' Association of

South Carolina, and during the year 1919-1920, served as president of the American Cotton Manufacturers' Association.

Mr. Hammett was born in Greenville, S. C., where he was a student at Furman University. He was the son of Colonel Henry P. Hammett, one of the pioneer cotton mill men of the Carolinas, who built the Piedmont Cotton Mills. In 1890, James D. Hammett began work at the Piedmont Mills as paymaster, ten years later taking the position of assistant treasurer at the Orr Cotton Mills. In 1902, he organized the Chiquola Mfg. Co., at Honea Path, which he directed as president and treasurer until his death. In 1907 he was induced to accept the management of the Watts Mills at Laurens, but resigned after several years, the distance separating this property and his other interests making careful supervision difficult and the position unsatisfactory. Soon afterward he was selected as president of the Anderson Cotton Mills and the Brogon Mills,

at Anderson, which he resigned in 1910 to accept the presidency of the Orr Cotton Mills upon the death of Dr. S. M. Orr.

Twenty-one members of the senior textile class of the North Carolina State College, Raleigh, N. C., recenttly inspected a number of textile mills in the Carolinas and Virginia. The trip was made in the "White Swan," one of the large buses of the Raleigh-Durham line.

The Erwin Cotton Mills, at Durham, N. C., were the first to be visited. Here the class saw the manufacture of finished wide sheetings and denims. From Durham the boys went to Greensboro, where they saw the Cone denim mills and the only printworks in the South. The next morning was spent in the Marshall Field plants at Leaksville and Spray, where Jacquard bedspreads, cotton blankets and Axminster carpets are made. After going through the mills the class was entertained at lunch by the management of the mills. In the afternoon the Riverside & Dan River Mills at Danville, Virginia, were visited.

On the next day a stop was made at the Erlanger Cotton Mills Company, at Lexington, where B. V. D. fabric is made. The afternoon was spent at the towel mills of the Cannon Mfg. Co., at Kannapolis, N. C. Prior to going through the mills the young men were entertained at lunch by C. A. Cannon, president of the mills.

In Charlotte the next day the plant of the Parks-Cramer Company, the Charlotte Knitting Mills, and the Chadwick-Hoskins Company were visited. A time was put in at the new power plant at Mountain Island, near Charlotte. At Mount Holly the class saw how yarn is mercerized at the plant of the American Yarn and Processing Company, and then proceeded to Gastonia, and visited the Loray and Arkray Mills.

The last town visited was Greenville, S. C., where the party was shown through the Judson and Dunean Mills. How mills are designed was demonstrated at the offices of J. E. Sirrine & Company. The Steel Heddle Mfg. Co. plant and the Union Bleachery were also visited, John W. Arrington, president of the bleachery, entertaining the boys at lunch.

The Yates Bleachery Company at Flintstone, Ga., mercerizers and finishes of piece goods, will soon install equipment for dyeing, it was recently announced by Arthur E. Yates, pesident of the oganization.

The appointment of G. E. Frick as superintendent of the plant was also announced. Mr. Frick has for some time been with the Kerr Bleachery & Finishing Company, at Concord, N. C.

Mr. Yates, president of the concern, is well known in the industry, having been for many years the general superintendent of the Crystal Springs Bleachery Company.

Under the designation, Alizarine Emeraldole G, The Grasselli Chemical Company announces the domestic manufacture of this well known color. The shade is a trifle bluer, but the strength, chemical reaction and properties of the domestic product are the same as the imported type, it is stated.

The subject of evener motions on breaker pickers has come into quite general discussion. With improved methods of opening and feeding, the adoption of two-process picking is increasing, and this is resulting in an increased demand for an evener motion on the breaker.

Of interest in connection with this subject is a pamphlet recently issued by the Saco-Lowell Shops descriptive of their new No. 6 evener, which they have designed in response to the demand just mentioned.

The cones on this evener are exceptionally large in order to avoid slippage, the pamphlet states, and the driving cone is equipped with ball bearings having the Alemite system of lubrication. An adjustment for the evener is provided in the form of a turnbuckle by which the position of the cone belt may be changed slightly when adjusting the evener.

A copy of the pamphlet will doubtless be sent to any mill man interested.

The American Engineering Standards Committee has just issued a small but interesting book entitled "Standardization—What It Is Doing for Industry." This describes how standardization is being carried on, first, in the individual plant, second, in industry as a whole, third, nationally on an inter-individual basis, and, fourth and last, internationally.

This book can be secured by writing to the office of the American Engineering Standards Committee, 29 West 39th St., New York City, or COTTON will secure copies for readers interested.

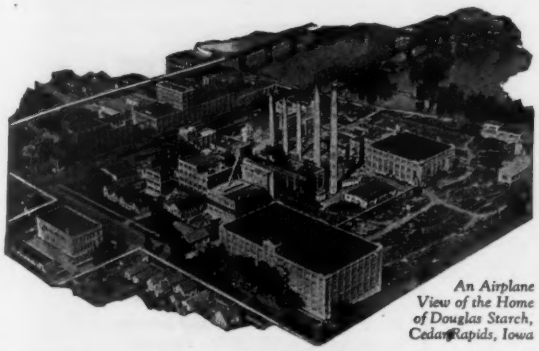
The Eagle Spinning Company, at Belmont, N. C., have secured from the Davis Septic Tank Company 217½ South Tryon St., Charlotte, N. C., 61 septic tanks, which are now being installed.

A cast pulp roving bobbin has been developed by The Textile Products Company, 133 Sheldon Street, Hartford, Conn. It is at present being made in the 7 x 3 and 7 x 3½-inch sizes, to fit the standard makes of roving frames. One feature of the bobbin which the company is emphasizing is a metal ferrule, which encases the bottom of the bobbin. This, the company state, lengthens the life of the bobbin and insures a fit on the spindle.

The bobbin is treated against the effect of oil, moisture and other conditions in the textile industry.

Another feature pointed out by the manufacturers is light weight of the bobbin, which is, of course, a big factor in shipping and requires less power to operate a frame on which they are used, it is stated.

"Industrial Power Plants" is the title of an attractive booklet just issued by Lockwood, Greene & Company, 24 Federal Street, Boston, Mass. The booklet is written and arranged in a manner to interest the men in charge of industrial plants, and the men in charge of their power plants. It discusses some phases of the design of industrial power plants as distinguished from the design of central power plants, being adequately illustrative by photographs showing exterior and interior views of industrial power plants designed by this firm of engineers. The booklet contains 40 pages of text matter and illustrations. It is bound in a neat cover, and the material shows careful thought in its arrangement.



An Airplane View of the Home of Douglas Starch, Cedar Rapids, Iowa

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Again available in all the various grades

For twenty years Douglas Starches have been used by the Textile Trade—having the highest reputation for quality and uniformity of any starches on the market.

The Douglas Company's plant has been purchased by Penick & Ford, Ltd., and rebuilt, including every worthwhile improvement known to the science of the industry. It is now operated by the same efficient organization as was formerly employed, thus assuring the highest standard of quality.

Douglas Starch is available in all special and standard grades—

DOUGLAS CROWN STARCH
(a refined thin boiling starch)
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DOUGLAS WARP SIZING STARCH
DOUGLAS LION MILL STARCH

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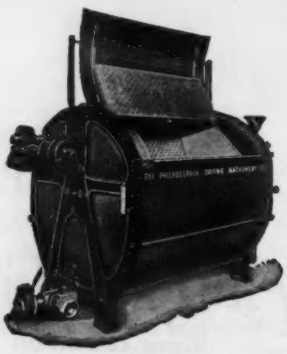

ALL MONEL DYEING MACHINE

This machine represents the latest development in the Hosiery Field. The tub and cylinder both being constructed of monel, permits easy cleaning of the machine and also allows the dyeing of various shades of colors.

The well-known "Hurricane" type of pocket and reversing mechanism is embodied in this machine as in our various other types. Built in 50 to 300 pound sizes.

Send for Bulletin RD-2 for further details.

Dyeing, Bleaching, Drying and Finishing Machinery for Hosiery.

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Ideal Drying Every Day

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THAT you may secure the advantages of convenience, improvement in fabric and economy in the operations of dyeing, bleaching, drying and finishing, call in a "HURRICANE" engineer. We make this easy to do by having a representative prepared to call on you with full information, at your request, without obligation. Write to our Home office, our Boston office or our Canadian Agents.

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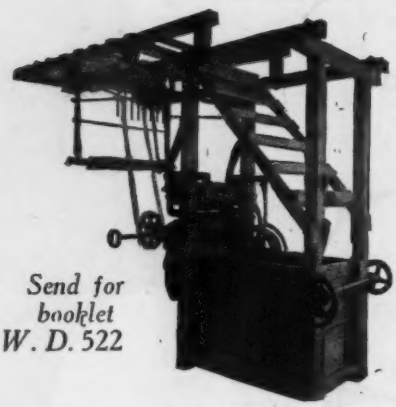
Canadian Agents: WHITEHEAD EMMANS, LTD., Montreal and Hamilton.
New England Agency: HURRICANE ENGINEERING CO. OF MASS.
53 State Street, Boston, Mass.

RODNEY HUNT MACHINE COMPANY

For Warp Dyeing



Send for booklet W. D. 522

You can be sure of uniform shades and thorough penetration without roughing of the yarn when you use a Rodney Hunt Warp Dyeing Machine. This machine is adapted for warps of cotton, silk, worsted and linen.

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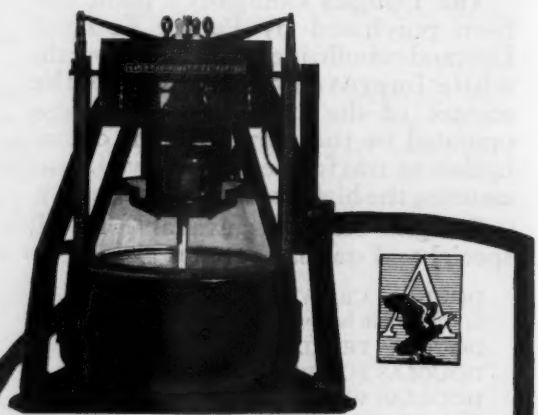
47 MILL STREET ORANGE, MASS.



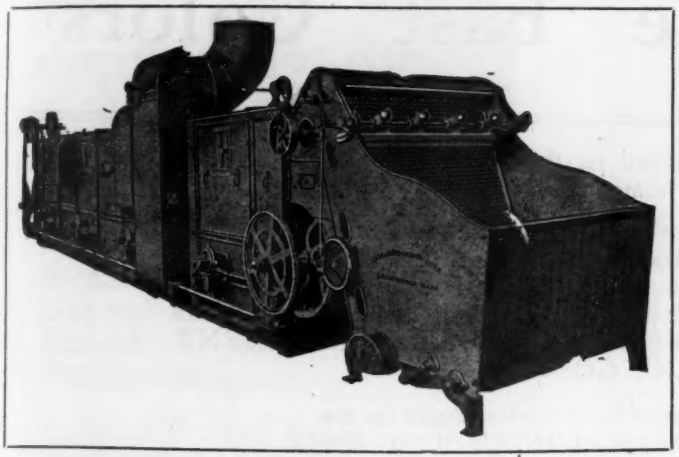
The American Humatic Hydro Extractor

provides the three things you want in your next extractor—high quality mechanical construction, automatic performance, 10% greater basket holding capacity. Write for bulletins.

The American Laundry Machinery Co.
Specialty Dept. C, Cincinnati, Ohio

The Canadian Laundry Machinery Co., Ltd., Toronto, Ontario, Canada.

The American HUMATIC Hydro EXTRACTOR



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For Drying—
Cotton
Wool
Hair, etc

a *new* feature has just been added to the Sargent Drying Machine—the swingshelf conveyor. This, in addition to such features as *automatic feed, ball bearing fans, perfect circulation,* and *rapid exhaustion* and drying makes Sargent Dryers an easy first choice.

C. G. SARGENT'S SONS CORPORATION

GRANITEVILLE, MASS. Southern Agent, Fred H. White, Charlotte, N. C.

The star among Sulphur Blacks—

Katigen Deep Black GGN Conc.

Dependable for shade, strength, solubility and uniformity.

The Grasselli Chemical Co.

Dyestuff Department

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Chlorantine Fast Colors

Distinguished for their unusual fastness to light

Chlorantine Fast Colors are not surpassed for level dyeing, where fastness to acid, alkali, rubbing and hot pressing are required. They are especially suitable for application to all goods which must withstand the action of light—such as CURTAINS, VELVETEENS, LINEN PLUSH, CASEMENT CLOTHS, UPHOLSTERY GOODS.

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install *Tycos* Double-duty Compound System Regulator to maintain a uniform temperature in each drying cylinder. This uniform temperature delivers the warp off the drum with just the right amount of moisture. Write for literature of other *Tycos* applications that effect economies in textile manufacture.

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The best quality tallow, palm, and red oils and olive foots, carefully balanced with the purest chemicals for your special purpose.

Uniformity guaranteed by test before shipment.

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He was so busy looking at the freaks at the Side Shows that he missed the Main Performance.

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Note the extreme simplicity of the Foxboro Improved Helical Tube Movement.

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This Movement is found only in Foxboro Recording Pressure Gauges and Thermometers.

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A product for the conversion and removal of starches, sizings, etc.

DIASTAZYME is especially adjusted for textile use, having high starch liquefying power.

Ask for sample. The product will prove itself.

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Are they as safe to the feet of active, busy workers as they can be made by the use of

WYANDOTTE DETERGENT?

This cleaner not only insures protection by maintaining floors free from grease and slipperiness but it also provides a floor that is clean, sanitary and easy to maintain in this condition.

Moreover Wyandotte Detergent works so easily and quickly, and is so harmless to the hands of the user that it proves a most profitable investment.

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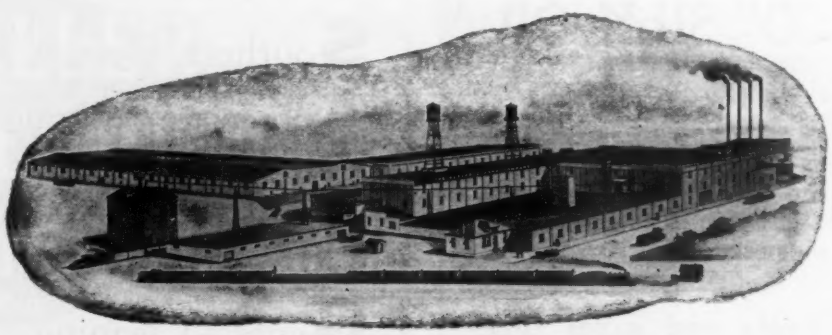

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The Weaver's Friend

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

A trial order will convince you that VICTOR STARCH has no equal on the market.

THE KEEVER STARCH COMPANY, Columbus, Ohio

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If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.

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Sulphoxylates and Allied Products.

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For reducing Indigo and vat dyes. Of highest quality and absolutely standard.

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"ARTCO" SILK OIL

for

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Hosiery and Sweater Knitters find "ARTCO" Silk Oil to be the best product for this purpose.

Prevents waste and saves time

Softens the Thread and lays the Fibre, and produces a Fine Lustre.

Samples and full information on request.

Manufactured only
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QUAKER CITY CHEMICAL COMPANY
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Southern Cotton Mills
Appreciate thoroughly the
Value and Neccessity
Of SAVOGRAN for
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Results Convince
Ask your Supply House
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INDIA ALKALI WORKS
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Uniform in Application

VICTROLYN

Penetrating, Lubricating, Dependable Assistant in Warp Sizing

KLORASENE

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Quality and Service

CLOTHS

Manufacturers are obtaining such perfect results from our Roller Cloths because it is made of the right material, with just the right cushion and uniformity of surface.

Our Clearer Cloth is constructed of the highest grade materials with strong nap that does not pull out and its uniform length is such that rolls are cleared entirely of short fibre.

Our Slasher Cloth is of the same high quality construction. It has sufficient cushion and is porous enough to thoroughly force the sizing into the yarn.

A small trial order will convince you of the superiority of these perfect cloths. Ask for samples and prices.

PHILADELPHIA FELT CO.

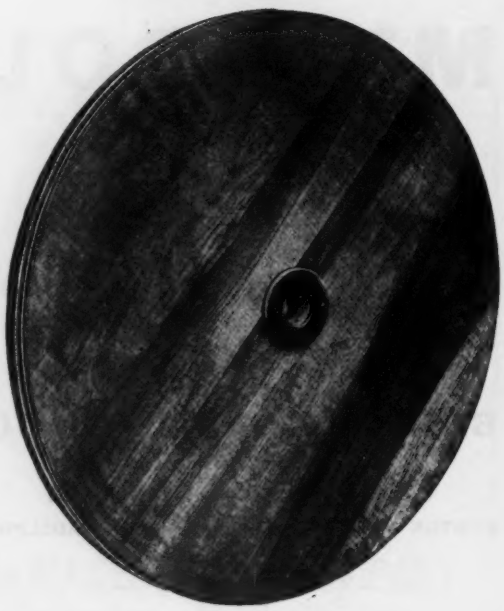
FRANKFORD, PHILADELPHIA, PA.

Fitz. Lee Putney. Treasurer

Southern Sales Agent, M.C. Sanders, Greenville, S.C.

The Light Weight Unbreakable Head

ALLEN CO.



PATENT

Wooden Beam Head

Allen Company Wooden Beam Heads are practically unbreakable, insuring longer life,—they are lighter in weight which insures ease of handling and also a great saving in freight charges. Out of the thousands in use, not one complaint has been received of one broken causing loss of yarn or expense of rewinding.

Constructed of three pieces of selected scientifically kiln dried Beech lumber, securely glued together under heavy hydraulic pressure. Accurately turned on centers. Protected on outside diameter from splintering and general wear by cold shaped upset steel tires. Finished by a water-proofing process and painted any desired color.

All Allen Company Products, tried under your own conditions, will prove profitable investments. Catalog showing the complete line gladly furnished on request. Ask for it today.

Allen Company

New Bedford, Mass.

Also Manufacturers of

Section Beams, Combination Section Beams, Beam Heads with brake drum, Top Beams, Beam Trucks, Box Trucks, Braider Reels, Lug Sticks, Mechanics' Benches, Overseers' Desks, Cabinets and other wooden specialties.

Cost

may be a primary consideration

The Liberty Knotter

not only fills the requirements of low first cost but is most simple in construction and economical in upkeep and operation. Give it a trial.

Guaranteed for one year

Write for information

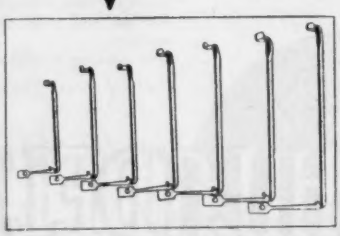
A. B. CARTER, Sales Agent,

Gastonia, N. C.

Mill Devices Co. Durham, N. C.

Are You Acquainted With These Flyer Pressers?

Flyer Pressers made from Norway Iron give the BEST Service. The use of Norway Iron in the manufacture of our Flyer Pressers is the surest indication of our honest endeavor to put out nothing but the BEST. That's why 85% of the Textile mills prefer our Flyer Pressers—because they know they are the best on the market.



Write for a Catalog

Southern Spindle & Flyer Co., Inc.

"We Manufacture
Overhaul and Repair Cotton Mill Machinery"

Charlotte, N. C.

W. H. MONTY, Pres. and Treas. W. H. HUTCHINS, V. Pres. and Secy.

Guaranteed Textile Brushes

PERKINS PRACTICAL BRUSH

ATLANTA BRUSH COMPANY

This Actually Happened—

This little story is based on actual facts. (We'll be glad to supply you names on request.)

Our salesman went to see the general manager of a big mill.

"Glad to see you," said the G. M. "Got an order for you. Glad to see your prices are down."

Our salesman took the order, looked at it and smiled. It was written in favor of another Brush Company.

"You've got me mixed up," he told the G. M. "I'm with the Atlanta Brush Company."

The G. M. took the order back, and with a shake of his head said, "Well, nothing today."

Then the salesman started to talk. After ten minutes he hadn't made much headway.

Then he made a request.

"I'll tell you what let's do," he said. "Let us call the overseer, the man who uses the brushes and let him decide. Don't you tell him who I am so he will be impartial."

The G. M. liked the idea. He called the overseer. Our salesman got the order.

ATLANTA BRUSH CO.
ATLANTA, GA.

ATLANTA BRUSH COMPANY

A BRUSH FOR EVERY TEXTILE NEED

Electric Scrubbing!

Helps Attract Good Workers and Aids Good Work

Gastonia, N. C.

Two of the Six Large Mills

Pawtucket, R. I.
Manville-Jenckes Spinning Co.

"There is nothing that so demoralizes working men as a dirty shop," said Henry Ford in an interview. "A dirty shop drives away good men and attracts bad ones."

This is just as true in the textile field. The Manville-Jenckes Spinning Company, large employers of labor, with mills in the north and south, does much that is practical to maintain cleanliness.

This company, and more than three hundred other textile companies *insist* upon *Clean Floors*—obtained the only economical way—the *Finnell System of Electric Scrubbing.*

The Finnell System in these mills insures floor cleanliness. It does not depend on human hands which tire and shirk. There are no pails of dirty water slopped on the floor and mopped off. There is a constant stream of clean water for every square inch—and the constant pressure of eight powerful brushes.

Free Booklet and Folder

Write for complete description of the Finnell System. Or ask for a private showing of our motion picture film.

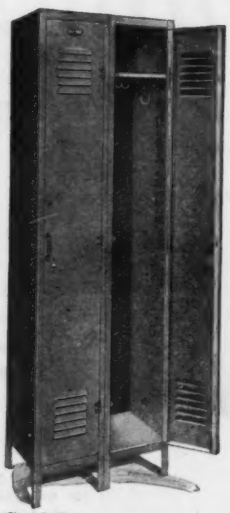
AMERICAN SCRUBBING EQUIPMENT SALES CO.
General Offices and Factories
54 Collier Street **Hannibal, Mo.**

Power Scrubbing Headquarters for Seventeen Years

FINNELL SYSTEM
OF ELECTRIC SCRUBBING

"Clean Floors Reflect Clean Business"

DURABILT
STEEL LOCKERS AND CABINETS



Send for
Locker folder 5008

Designed for Hard Service
Built of Finest Materials
Finished with Care

Provide—
Simple and Convenient Operation—
Maximum Security and Durability

Exclusive Features

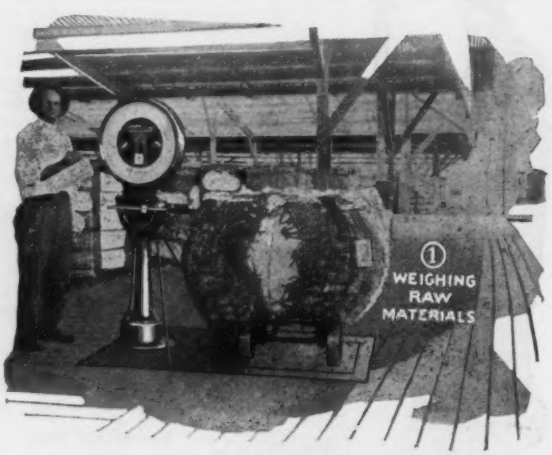
1. Concealed, one-piece, automatic Latching Device
2. Straight-Lift, stamped-steel (not cast) Handle
3. Five-Knuckle, full-looped, double-wear "strap" Hinges
4. Scientifically reinforced rigid Door
5. Extra heavy, countersunk riveted Door Frame
6. Unusually Large Ventilating Louvres

"No Better Built than Durabilt"

With our modern factory devoted EXCLUSIVELY to the manufacture of steel lockers and cabinets we are prepared to render unexcelled service on your requirements.

Send for
Cabinet Folder 5009

Durabilt Steel Locker Co., 420 Arnold Ave., Aurora, Ill.
Sales Offices in all Principal Cities.



Automatic Scales
For Weighing and Checking

Raw Material	Tops	Yarn
Sorts	Laps	Yardage
Soap, Alkali and Dyes	Bobbins	Section Beams
Balls and Silver	Roving	Shipments
Test Pieces		And for many other purposes

Toledo Scale Company, Toledo, Ohio
Canadian Toledo Scale Co., Limited, Windsor, Ontario
Largest Automatic Scale Manufacturers in the World
106 Sales Room and Service Stations in the United States and Canada. Others in thirty-four foreign countries

MILLS METAL

Attractive **Sanitary**
Permanent

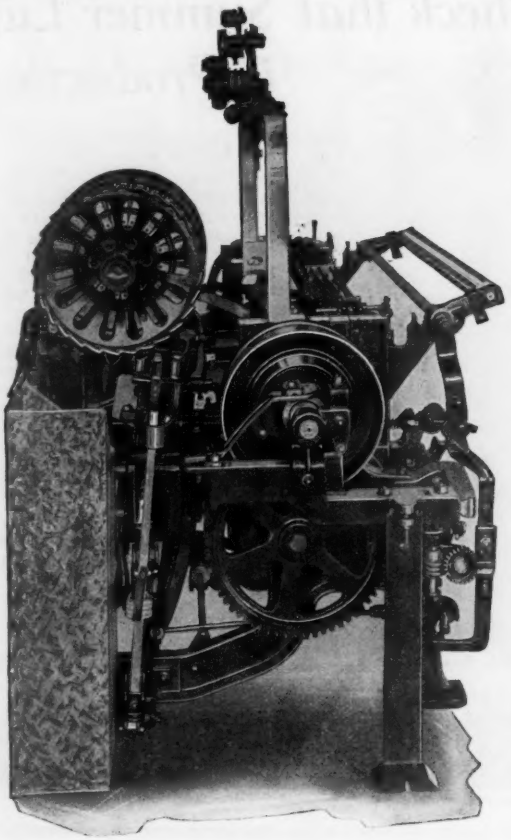
TOILET PARTITIONS
DRESSING ROOMS
SHOWER STALLS
SHELVING
TABLES
DOORS
BINS

Constructed entirely of the highest quality rust-resisting steel, "Mills Metal" Products are ideal for use in textile mills.

They are strongly built, slant lip diamond rail top and bottom and heavily enameled in Gray or Olive Green.

Write for bulletins.

THE MILLS COMPANY
Dept. A, **Cleveland, Ohio**



The Latest
NORDRAY
Automatic Loom

Multiple-harness, Feeler type

built by

HOPEDALE MANUFACTURING CO.

at MILFORD, MASS.

SOUTHERN OFFICE at
GREENVILLE, S. C.

This loom was shown at the Late Greenville Exposition and excited great interest.

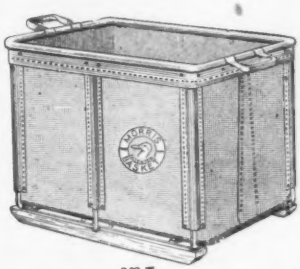
It is Still the Simplest.

MORRIS TRADE MARK PATENTED BASKET

Is your BASKET TRANSPORTATION EFFICIENT?

It is if you use Morris Duck Baskets. Service is never interrupted by sagging, broken-down receptacles—goods are never damaged—when these sturdy, long-lived baskets are installed.

Morris Duck Baskets take knocks and blows without flinching— give equal protection to heavy or delicate materials. Frames of Round Spring Steel give strength—tightly woven cotton duck (canvas) coverings impart necessary flexibility. Your choice of wood or steel runners.



№ 7

№ 19

There is a Morris Duck Basket for every mill requirement—each one a master in its class.

Send for booklet which shows how to make your basket "line" pay dividends. Prices gladly furnished.

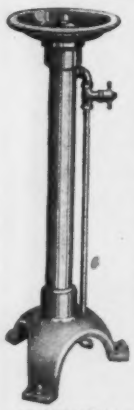
MORRIS & CO., INC.

15 Chestnut Street

Groveville, N. J.

MURDOCK
WATER SERVICE

DRINKING FOUNTAINS FOR FACTORIES—MILLS



"SANDOW" Self-closing Fountain — Bronze Bowl and Bubbler

Real water devices made for heavy duty service. FOOL-PROOF. Bubbler is adjustable to water pressure and affords a full soft bubble and a satisfying drink. A thin squirting stream is impossible.

Bubbler heads and stop cocks sold separately when wanted.

Outdoor Bubble Fonts for Playgrounds.

Yard Hydrants —Fire Hydrants

"HERCULES" Cast Brass Wall Fountain

Write for fully illustrated catalogues.

The Murdock Mfg. & Supply Co.
Cincinnati, Ohio.
Makers of Anti-freezing Water Devices since 1853

Check that Summer Lull in Production Now!

Remember your initial cost is your last cost when you buy R-S fountains.

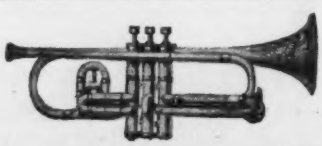
It's only natural for workers to lose their "keen-edge" in the summer time. And likewise there follows a lull in production. The hot, sullen days not far off will narrow your profit margin unless you *take action now.*

Install R-S drinking fountains. Keep your production up by keeping your workmen *fit.* Invigorate them with cool, fresh, clear water bubbling from R-S fountains, and know each drink is a healthy one—for *lips cannot touch the nozzle.* A special "vertico" slant prevents them.

Check that summer lull in production now. Write for more information.

RUNDLE-SPENCE MFG. CO.
57 4th Street MILWAUKEE, WISCONSIN

R-S "Lips can't touch the R-S nozzle" R-S



A Band Helps to Make Contented Workmen

INDUSTRIAL bands are a great force for good—welding a body of employes together, inspiring loyalty, providing amusement and recreation and actually speeding up production.

Conn will Help You Organize

We've helped to organize and have equipped hundreds of bands—our experience is at your service, without obligation. Conn instruments, easy to blow, beautiful in tone, perfect in scale, reliable in action—ideal for beginners as well as professionals.

JOHN PHILIP SOUSA *uses and endorses Conn instruments.*

Write today to

C. G. CONN, LTD.
515 Conn Bldg., Elkhart, Ind.

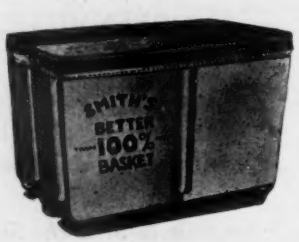
THE BASKET WITH 3 LIVES

Smith's 100% Better Baskets can truly be called "The baskets with 3 lives"—when other baskets are completely worn out the Smith basket needs only a new cover to make it as good as new.

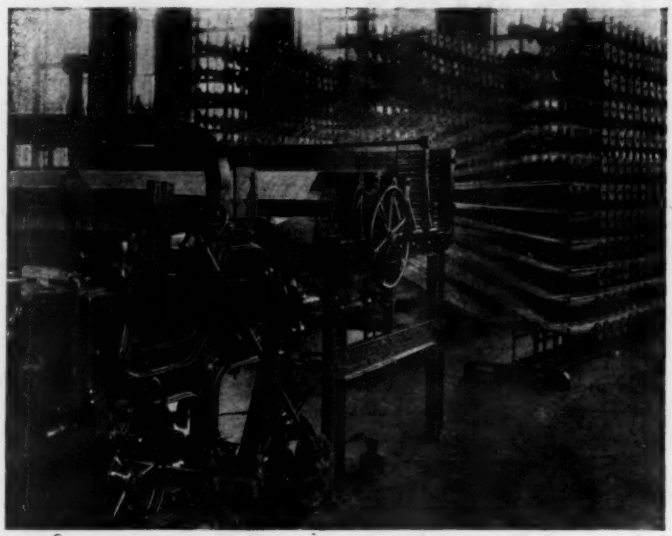
SMITH'S TRADE 100% MARK BETTER BASKET

The framework is made of steel and hardwood and is extremely strong and durable. Send for one or more and try them out under your own conditions. They are light, strong and almost indestructible.

SMITH
MANUFACTURING COMPANY
DALTON GEORGIA



SPECIALISTS IN
JACK SPOOLING AND BEAMING MACHINERY
WOOL, WORSTED, COTTON, JUTE, ETC,



WEAVING-DIRECT OUTFIT for cord, and special fabrics.

WARPER CREEL and TENSION DRESSER, shown in connection with the loom for weaving cord fabric.

WARPER CREEL built in stationary and heavy base models.

Standard spacing 6" x 6½" for maximum 5" x 8" spools or tubes. Special spacing to mills' requirements.

UNIFORM TENSION from WARPER CREEL to loom.

Highest efficiency test in your goods. PRODUCTION plus QUALITY.

WARP COMPRESSING MACHINE CO. Worcester, Mass. U. S. A.

Representative: F. W. KIESSLING, *Worcester, Mass.*

They Stand the Gaff

The tremendous racking speed with which a shuttle is driven across the loom calls for a construction which can readily absorb the repeated shocks.

The makers of Williams' Shuttles fully appreciate the rigorous condition under which they must be used. This fact is reflected in the shuttles themselves. Only wood of good quality is used—no seconds are marketed. Moreover the springs are wellnigh unbreakable, while the workmanship is expert.

Williams' Shuttles work in harmony with the rest of the room. They are a real factor in smooth-running loom production.

Ask about our plan for the reduction of your shuttle investment.

The J. H. Williams Co.
"The Shuttle People"
Millbury, Mass.

George F. Bahan, Southern Representative, Charlotte, N. C.

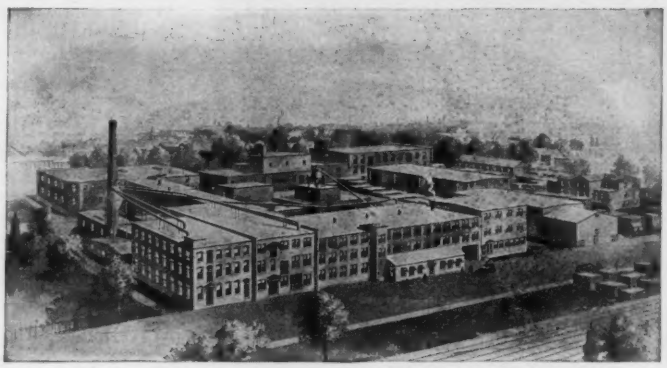
Bobbins Spools Skewers
Tubes Rolls
Manufacturers and Enamelers

OUR CUSTOMERS SAY

The careful attention that we give to the manufacture of their requirements means a stronger and more reliable Bobbin for them, while to us it means repeat orders.

We put all styles of reinforcements on Bobbins and Spools for conditioning of yarns.

All Bobbins enameled by our own process.



OUR PRODUCTS WHATEVER YOU USE WE MAKE

For service and prompt attention write us.

Walter L. Parker Co.
Lowell, Mass.

SONOCO
CONES, CONVOLUTE TUBES, WINDING CORES

Winds a handsome package

"Yarnsaver"

Has a Polished Round Nose

that without a hitch: with even tension throughout, delivers the last inch of yarn to the Knitter.

No cobwebbing No waste

Sonoco Products Co., Manufacturer

Office and Factory, Hartsville, S. C.

Eastern Office, 410 Olympia Bldg., New Bedford, Mass.

Canada: W. J. Westaway Co. Ltd., Hamilton, Ont.

You All KnowThis Box

LOWELL Crayon Co. Lowell Mass. U.S.A.
This box is warranted to contain 5 lbs. of Crayons
Trade Mark No. 43172, Reg. Aug. 16, 1904
CRAYONS
Made by
LOWELL CRAYON CO.
ORIGINAL MANUFACTURERS
LOWELL, MASS.
U. S. A.

All Steel Loom and Section Beam Heads

Cannot Break
Do not Bend

"ALL STEEL" LOOM BEAM HEAD
"MALLEABLE" GEAR
PATENT PENDING

"ALL STEEL" SECTION BEAM HEAD
PATENTED

"ALL STEEL" ADJUSTABLE HEAD
SPLIT OR SOLID TYPE
PATENT PENDING

DUPLICATE YOUR CAST IRON HEAD IN STEEL—ELIMINATE ALL BREAKAGE
MAKE YOUR BEAM HEAD INVESTMENT PERMANENT

Mossberg Pressed Steel Corporation

Attleboro, Mass.

Headquarters for

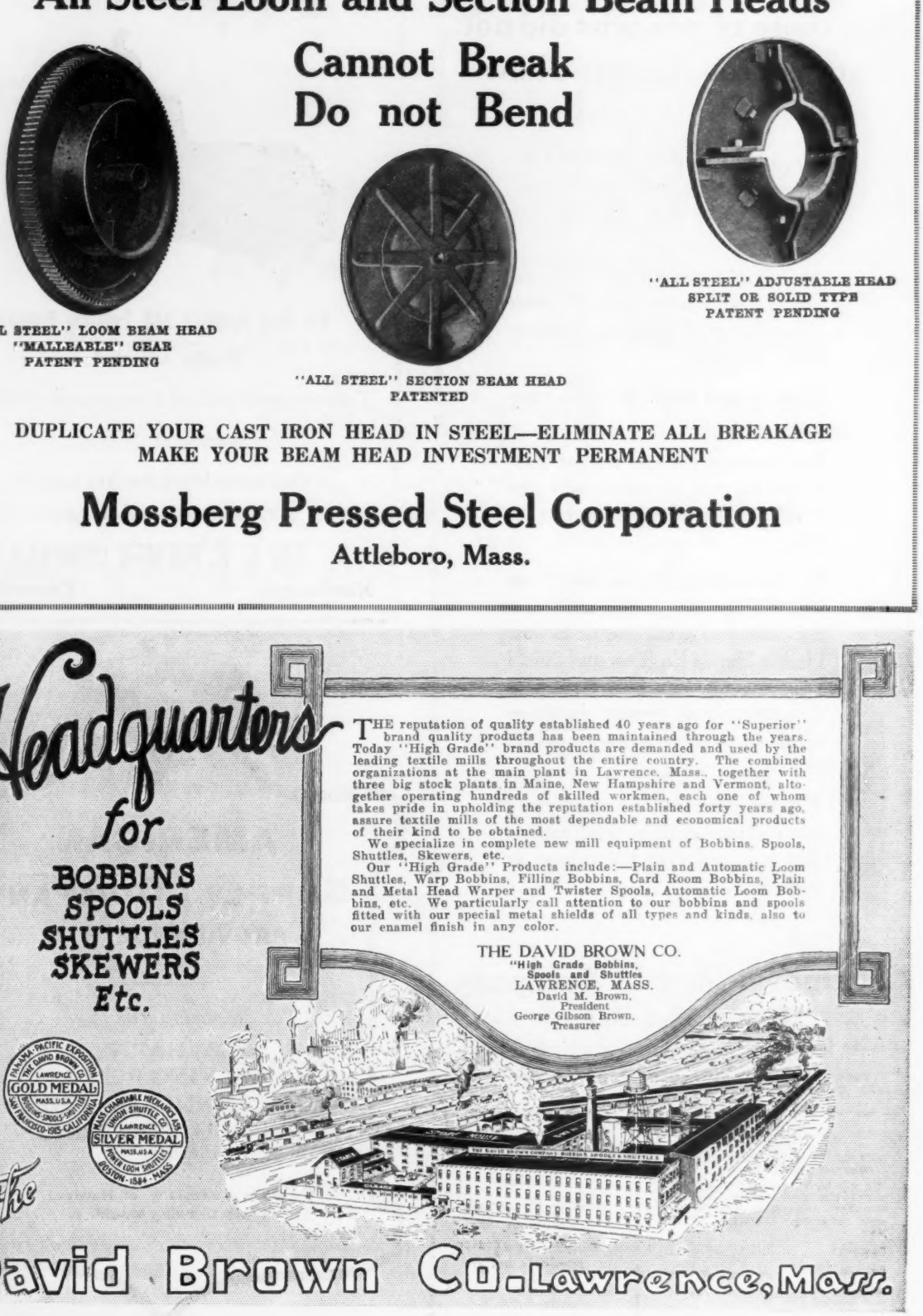
BOBBINS
SPOOLS
SHUTTLES
SKEWERS
Etc.

THE reputation of quality established 40 years ago for "Superior" brand quality products has been maintained through the years. Today "High Grade" brand products are demanded and used by the leading textile mills throughout the entire country. The combined organizations at the main plant in Lawrence, Mass., together with three big stock plants in Maine, New Hampshire and Vermont, altogether operating hundreds of skilled workmen, each one of whom takes pride in upholding the reputation established forty years ago, assure textile mills of the most dependable and economical products of their kind to be obtained.

We specialize in complete new mill equipment of Bobbins, Spools, Shuttles, Skewers, etc.

Our "High Grade" Products include:—Plain and Automatic Loom Shuttles, Warp Bobbins, Filling Bobbins, Card Room Bobbins, Plain and Metal Head Warper and Twister Spools, Automatic Loom Bobbins, etc. We particularly call attention to our bobbins and spools fitted with our special metal shields of all types and kinds, also to our enamel finish in any color.

THE DAVID BROWN CO.
"High Grade Bobbins, Spools and Shuttles"
LAWRENCE, MASS.
David M. Brown,
President
George Gibson Brown,
Treasurer



The David Brown Co. Lawrence, Mass.

For those of you who did not attend the Textile Show

It was too bad that you missed the many new ideas and improvements that have been developed since the last show.

At "Shuttle Headquarters" for instance, there was an unusually interesting display of Shambow "Custom Built" Shuttles.

They created much favorable comment.

But, because you did not see them at the show is no reason why you shouldn't have an opportunity to see them.

We are prepared to send you a man who will show you shuttles and weaving devices of great interest to you. He is a Shuttle Engineer and should you require it, he is fully capable of redesigning your present shuttle or designing an entirely new model for you.

This expert service won't cost you a cent and may save you much money. Just sign and mail the coupon or write us.

Shambow Shuttle Company

Woonsocket, R. I.

JOHN C. SHAMBOW, Pres. & Treas. H. H. ULLMAN, V. Pres. & Gen. Mgr.

Philadelphia 42 421 Bulletin Bldg. Paterson, N. J. 245 Straight St. Greenville, S. C. Southern Factory

COUPON

SHAMBOW SHUTTLE CO., Woonsocket, R. I.

We will be interested to learn more about the new shuttles, tensions, threaders and other devices without obligating ourselves in any way.

Company .....

By .....

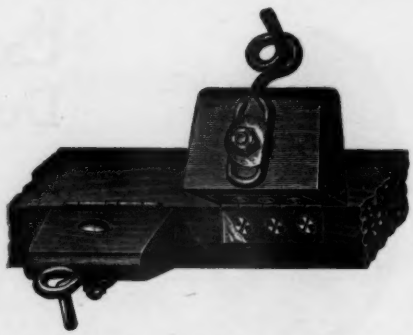
Address .....

.....

SHAMBOW MAKES

shuttle bills smaller
interruptions fewer
production greater
products better

The Palmer Adjustable Thread Guide



For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

AMERICAN

SUPPLY COMPANY

PROVIDENCE, R. I.

Manufacturers of

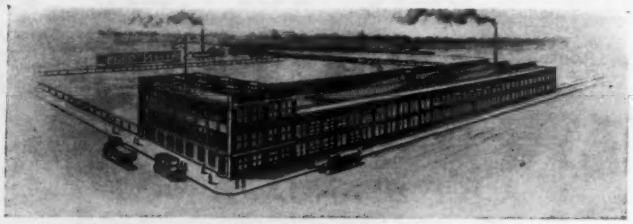
LOOM HARNESS,
WEAVING REEDS,
OAK TANNED LEATHER
BELTING, STRAPPING,
ETC.

We make a specialty of Harness for Warp Drawing Machines

WICACO

Stenton Avenue
and Louden Street

Wayne Junction
P. & R. R. R.



Established 1868

56 Years of
Continuous
Production

SCREW & MACHINE WORKS, INC.

PHILADELPHIA

The most modern factory and equipment in the United States for producing

Parts for Textile Machinery

SPINDLES

All shapes, sizes, quantities, materials for all purposes

Bushings, gears, worm gears, bearings, screws, piston rings, tools, jigs, fixtures, etc.

Unexcelled in Quality and Service—Seldom Equalled in Quantity

Grinding, Oil Grooving, Thread Milling, Heat Treating, Machine Work of Precision.

We Manufacture—

LOOM REEDS - - - - - - - - - - - - - -

Heavy Duck and Fancy Reeds a Specialty - - - - - -
Also Sliding Hook and Double Bar - - - - - - - - -

HEDDLE FRAMES - - - - - - - - - -

Made with Iron or Wood Ends - - - - - - - - - - - - - - -

TWIN STEEL WIRE HEDDLES

With or without Inserted Eyes - - - - - - - - - - - - - - - - - - -

Samples and Prices Furnished on Request.

WALKER MANUFACTURING CO., INC.

ESTABLISHED 1875

Kensington Ave. and Ontario St., Philadelphia, Pa.

Southern Office: 201 Augusta St., Greenville, S. C.

A Vital Point for the Reader of this Paper

A B P STANDARD No. 1
"To consider FIRST the interests of the subscriber."

EVERY member of the A B P Inc., of which this paper is one, has subscribed to this and to **nine other** standards covering every department of publishing practice. The A B P label stands for all that is best in publishing; the things which make a business paper one of the essential working tools of the successful business or professional man.

In interpreting Standard No. 1 the constitution bars from membership papers of free circulation, publications which are owned directly or indirectly by an association or an advertiser; and in the words of the constitution itself,—member papers "must not be organs or mouthpieces of any house or combination of houses to further its or their special interest as against the joint interest of the trade or class."

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Because such a paper must have a legitimate PAID circulation, its control is wholly in the hands of the subscribers. The subscribers determine whether the paper shall live or die by giving or withholding their subscriptions.

This is not true of the paper with a circulation controlled by the ones who issue it; which goes to you whether or not it is needed or wanted. The obligation of such a paper necessarily is to its advertisers or whatever interests may be back of it.

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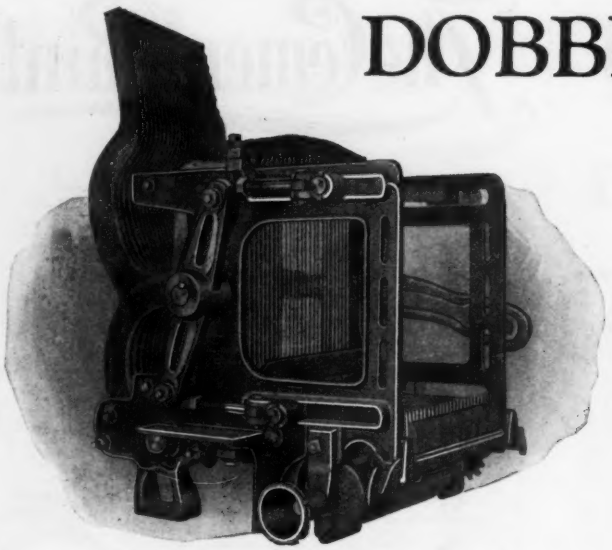
Standard No. 1 is placed first because it IS first in our conception of publishing practice. Everything else is secondary to the main purpose of serving the subscriber with courage and unswerving fidelity.

THE ASSOCIATED BUSINESS PAPERS, Inc.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: **220 WEST 42nd STREET** **NEW YORK CITY**

DOBBIES



Crompton & Knowles Double Index Dobby

We now equip dobbies of this type with pressed steel hook levers (patented) and drop forged top and bottom hooks (patented).

Slotted fingers and locking rod make it easy to remove, clean, and replace the fingers.

Crompton & Knowles Dobbies can be applied readily to any make or type of loom and will outwear any other dobbies on the market.

CROMPTON & KNOWLES LOOM WORKS

WORCESTER, MASS.

PROVIDENCE, R.I. PHILADELPHIA, PA. PATERSON, N. J.

S. B. ALEXANDER Southern Manager, Charlotte, N. C.

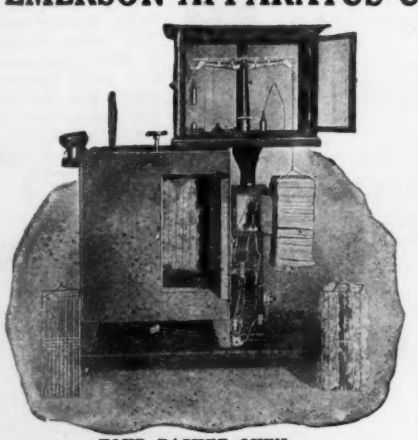
Do You Know the Amount of Water In Your Raw Materials?

The amount of moisture contained in the raw materials—and—materials in process should be determined if your business is to be conducted in an efficient manner.

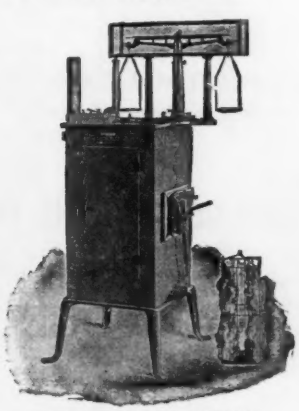
Emerson Conditioning Ovens Offer

The most convenient method for moisture determination. The ovens are all electrically heated. There are four types of Emerson ovens covering the various conditions of testing in the textile industry.
Neglect to account for moisture results in losses. The Emerson Conditioning Ovens are all electrically heated and can be fitted to operate on either A. C. or D. C. circuits. Write

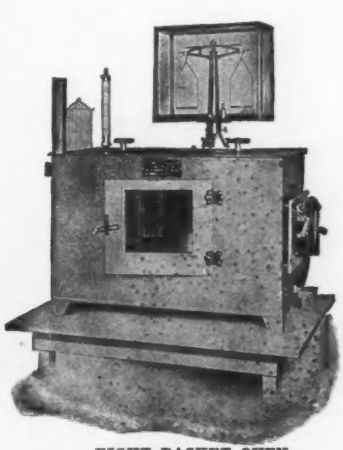
EMERSON APPARATUS CO., 171 Tremont Street Melrose, Mass.



FOUR BASKET OVEN
(Baskets, 7 in. x 7 in. x 18 in. deep)



SINGLE BASKET OVEN
(Baskets, 7 in. x 7 in. x 18 in. deep)

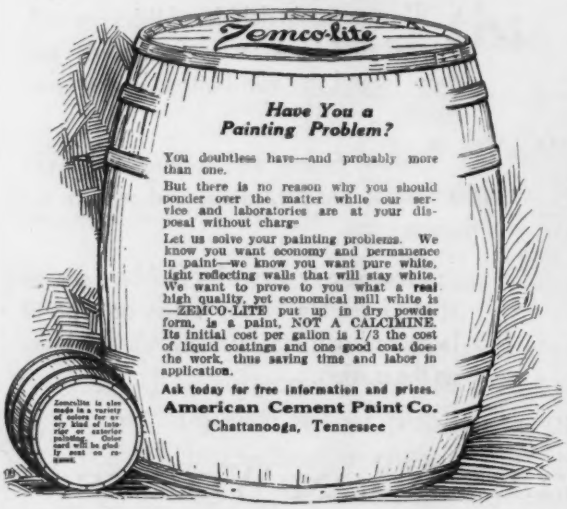


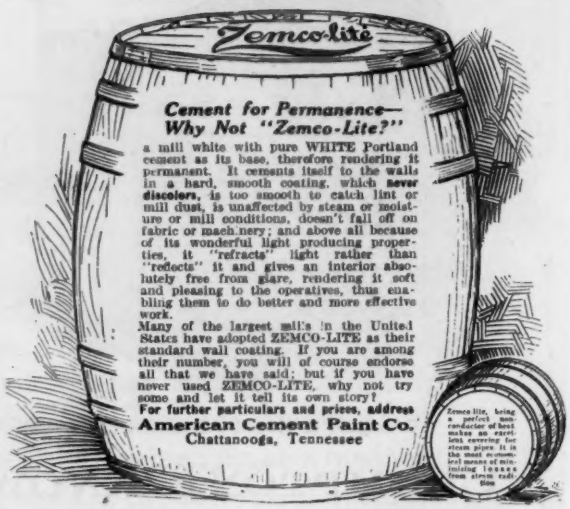
EIGHT BASKET OVEN
(Baskets, 3 in. x 3 in. x 6 in. deep)

Zemco-lite

TRADE MARK

The Cement Paint

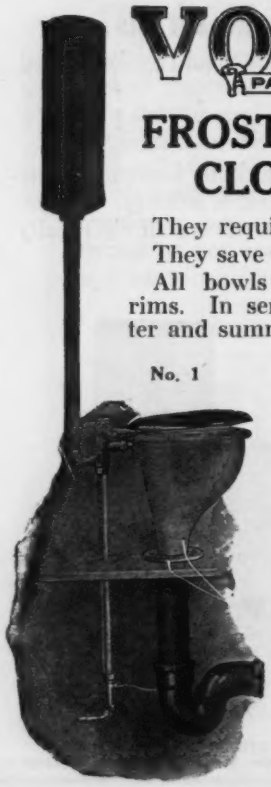

Zemco-lite
Have You a Painting Problem?
You doubtless have—and probably more than one.
But there is no reason why you should ponder over the matter while our service and laboratories are at your disposal without charge
Let us solve your painting problems. We know you want economy and permanence in paint—we know you want pure white, light reflecting walls that will stay white. We want to prove to you what a real high quality, yet economical mill white is —ZEMCO-LITE put up in dry powder form, is a paint, NOT A CALCIMINE. Its initial cost per gallon is 1/3 the cost of liquid coatings and one good coat does the work, thus saving time and labor in application.
Ask today for free information and prices.
American Cement Paint Co.
Chattanooga, Tennessee


Zemco-lite
Cement for Permanence—Why Not "Zemco-Lite?"
a mill white with pure WHITE Portland cement as its base, therefore rendering it permanent. It cements itself to the walls in a hard, smooth coating, which never discolors, is too smooth to catch lint or mill dust, is unaffected by steam or moisture or mill conditions, doesn't fall off on fabric or machinery; and above all because of its wonderful light producing properties, it "refracts" light rather than "reflects" it and gives an interior absolutely free from glare, rendering it soft and pleasing to the operatives, thus enabling them to do better and more effective work.
Many of the largest mills in the United States have adopted ZEMCO-LITE as their standard wall coating. If you are among their number, you will of course endorse all that we have said; but if you have never used ZEMCO-LITE, why not try some and let it tell its own story?
For further particulars and prices, address
American Cement Paint Co.
Chattanooga, Tennessee

Like Cement — It Improves With Age

VOGEL PATENTED

OVER 350,000 *Giving Satisfaction in All Climates*



FROST PROOF CLOSETS

They require no pit.
They save water.
All bowls have enameled rims. In service daily, winter and summer.

No. 1

The ideal water closets for Factories and Mill Villages, where thousands have been installed.

The most durable water closets made — excepting none.

Every Fixture Tested Under Hydraulic Pressure Before Leaving Factory.

INSIST ON GETTING THE VOGEL

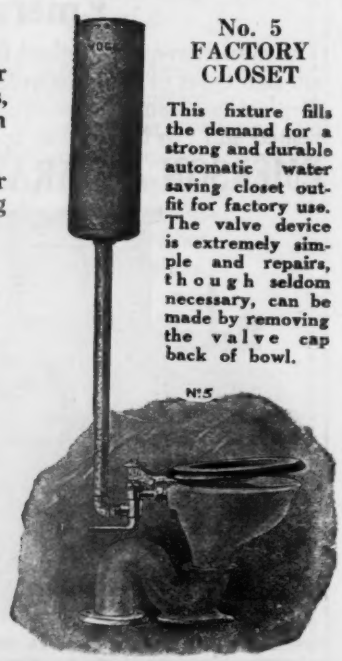
Ask your jobber

JOSEPH A. VOGEL CO.

Factory and Office at

WILMINGTON, DEL.

VOGEL PATENTED



No. 5 FACTORY CLOSET

This fixture fills the demand for a strong and durable automatic water saving closet outfit for factory use. The valve device is extremely simple and repairs, though seldom necessary, can be made by removing the valve cap back of bowl.

Like a Rubber Blanket!

Let Nature Vulcanize Your Roofs!

SAVE your roofs! Make them last at least ten years longer at small cost by treating them with **Hascall's TopKoter,** the original flexible water-proofing compound that is *vulcanized to the old roofing by Nature!*

Flexible—with Great Tensile Strength

This vulcanization by Nature gives **Hascall's TopKoter** unusual flexibility that allows for expansion and contraction of your roofs in the changing seasons. About 25% of this roofing compound consists of rock asbestos fibre. This element not only gives it great tensile strength, but also produces excellent fire-retarding properties—so much so that **Hascall's TopKoter** passes the Board of Underwriters' specifications. It is acid- and alkali-proof, and guaranteed to be absolutely water-proof.

Vulcanized by Nature—for Any kind of Roof

Hascall's TopKoter is *not* a paint. It produces a flexible, water-proof covering ten times the thickness of a paint film. It does not dry like a coat of paint but "cures" slowly *under Nature's own conditions.* **Hascall's TopKoter** adheres tenaciously to any kind of roofing—old or new. You simply flow it on with a roofing brush. Any ordinary day laborer can easily spread **Hascall's TopKoter** with most satisfactory results.

Guaranteed for 10 Years—Shipped on Approval

The largest users of roofing in the country know the merits of **Hascall's TopKoter** as well as we do. That's why we back it with an iron-clad guarantee good for ten years. We will gladly ship on six months' trial as many barrels as you need to water-proof your roofs. **Hascall's TopKoter** is shipped in air-tight, non-leakable, friction-top steel drums.

Exceptionally Low in Price

We employ no salesmen, jobbers or dealers. Thus we can quote a very low price.

Over 100,000 Satisfied Users

The best evidence of the true worth of Hascall Products is the fact that in 20 years of our serving the public we have built a list of over 100,000 satisfied users.

Free Roof Inspection

We maintain a Service Department that is always at your disposal. If you have any particular roofing problem—and conditions warrant—we'll send a roofing expert to make inspection and recommendations.

Because we employ no salesmen, jobbers or dealers, we make a direct contact, "factory to user". Hence we suggest that you write us direct regarding your roofing problems.

THE HASCALL PAINT COMPANY
WEST 70th ST. at N. Y. C. R. R. CLEVELAND, OHIO

Hascall's
ESTABLISHED 1904
TopKoter for ROOFS

Some Well-known Users of Hascall's TopKoter:

Jones-Laughlin Steel Company, Pittsburgh
Wills Sainte Claire, Inc., Marysville, Mich.
Missouri Pacific Railroad, St. Louis, Mo.
Arthur Brisbane, New York City
Hazel Atlas Glass Company, Blackwell, Okla.
Commercial Sash & Door Co., Beaver Falls, Pa.
Libby, McNeil & Libby, Chicago, Illinois
Atlas Powder Company, Wilmington, Del.
Pilsen Fdy. & Iron Wks. Chicago
Steel and Tube Company of America, Chicago
Standard Steel Car Co., Hammond, Ind.
Sadie Cotton Mills, Kings Mountain, N. C.
Seaboard Oil & Guano Co., Chincoteague, Va.
Moline Plow Works, Poughkeepsie, N. Y.
Booth Fisheries, Chicago
American Car & Foundry Co., Berwick, Pa.
Hoffman Heater Co., Lorain, O.

"Galv-After"
Chain Link Fence Fabric

HEAVILY ZINC-COATED (or Hot-Galvanized) by HOT-DIPPING PROCESS AFTER DYEING

Here again the Cyclone organization has asserted its leadership—producing successfully for the first time Fence Fabric Heavily Zinc-Coated (or Hot-Galvanized) by Hot-Dipping Process AFTER Weaving. This fence fabric lasts many years longer than fabric made of wire galvanized before weaving; does not require annual painting expense.

Write nearest Cyclone Offices, Dept. 35, for complete information about Cyclone "Galv-After" Fence and Cyclone Service which solves any fencing problem.

CYCLONE FENCE COMPANY

FACTORIES AND OFFICES: Waukegan, Ill.; Cleveland, Ohio; Newark, N. J.; Fort Worth, Texas; Oakland, Calif. (Standard Fence Co.); Portland, Ore. (Northwest Fence and Wire Works).

The Mark of Quality — Cyclone "Red Top" FENCE AND PRODUCTS — Fence and Service

Cyclone Fence

PROPERTY PROTECTION PAYS

"Done by Murphy"—

means that the job has been done by roofing experts with over 42 years experience in selecting and putting on roofing that's best suited for each individual building.

Murphy Roofs are of the highest class possible and made especially to withstand the blistering sun and quick changes of the Southern climate.

"Done by Murphy" has meant years of satisfaction to the large number of textile men who have called on us.

C. P. MURPHY'S SONS

ESTABLISHED 42 YEARS ATLANTA, GA.

Approximately 1,500,000 Barrels "Royal Cement" Shipped Into Southeastern States Last Year

DIXIE PORTLAND CEMENT CO. ROYAL CHATTANOOGA, TENN.

Is tested in our laboratory every 60 minutes. The quality of our product is only equaled by our service in the handling of large jobs.

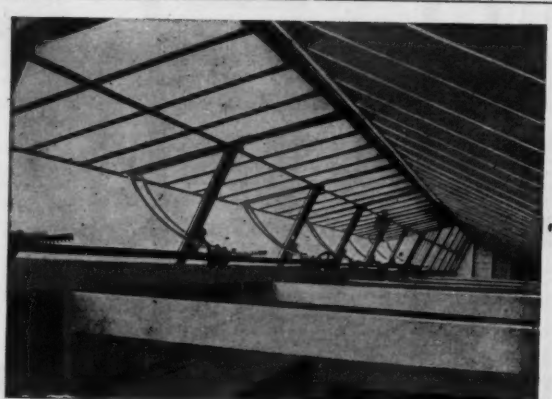
DIXIE PORTLAND CEMENT CO.

CHATTANOOGA, TENN.

GEORGE DOWMAN

610-611 Walton Bldg., Atlanta, Ga.

Southern Selling Agent for Quality Products plus "Dowman Service"



Better Ventilation

Plenty of fresh air without draft or dust is a wonderful stimulus to production. Both old and new buildings may be easily equipped with

Callahan Sash Operators

For any type of pivoted or hinged wood or steel sash. We have an Engineering Department that will work with you or your architect in the development of plans. Let us give you an estimate.

THE T. J. CALLAHAN CO.

804 S. Perry St. Dayton, Ohio

GEORGE DOWMAN

610 611 WALTON BLDG., ATLANTA, GA.

"DOWMAN SERVICE" IS KNOWN ALL OVER THE SOUTH. TAKE ADVANTAGE OF THIS SERVICE WHEN IN NEED OF ANY OF THE FOLLOWING:

FIRE PROOF DOORS
SOLID STEEL SASH
HOLLOW METAL WINDOWS
STEEL CASEMENTS
VENTILATORS
METAL CEILINGS
STEEL BUILDINGS
METAL LATH
STEEL FENCE
SASH OPERATORS
OVERHEAD CARRIERS
ETC.

SEND FOR CATALOGS AND PRICES

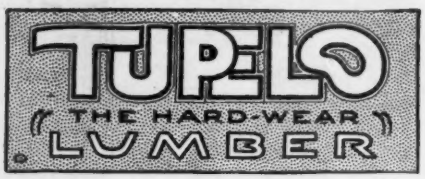
Tough Tests for TUPELO

"THE HARD SOFT WOOD."

For a factory floor where the wear is **hard**
and continuous—

For a warehouse floor where the wear is **harder**
because of heavy loads coming and going—

For a platform, where the wear is **hardest**
with heavy truck wheels constantly rolling back and forth—



stands the gaff, because of its tough, closely "knitted" or "involved" grain, which prevents it from "slivering" or "kicking" up.

TUPELO is good looking, too. Takes a fine finish.

Before placing an order for FLOORING for any use, write us and get the complete facts about TUPELO.

SOUTHERN CYPRESS MANUFACTURERS' ASSOCIATION
805 Poydras Bldg., New Orleans, La., or 805 Graham Bldg., Jacksonville, Fla.

Leaders in Quality Products for 44 Years

For two generations careful buyers of paint products have turned to Cooledge Hygrade Paints and Varnishes in fullest confidence that the utmost in quality—wear—appearance and low cost may be relied upon. In all these years a complaint on Cooledge Hygrade products has been rare indeed.

C-H Mill Cottage Paint
The best outside paint that man's ingenuity can put together. Absolutely pure, spreads easily in any weather, covers solidly and outwears all others in the Southern climate.

Perma-Gloss Mill White Enamel
Strictly high grade, pure white, high gloss enamel. Flows easy—goes far and stands all manner of hard wear. Matchless for sanitary, economical finish on walls and woodwork.

Bungalo Shingle Stain
A penetrating stain; made of the most reliable, sun-resisting colors, fresh- refined creosote and pure oils. We believe this to be the most economical shingle stain made. It wears past all expectation.

Perma-Tint Kalsomine
Positively the highest grade, best wearing, best appearing kalsomine possible to make. A great improvement over foregoing kalsomines. Supplied in white and standard tints.

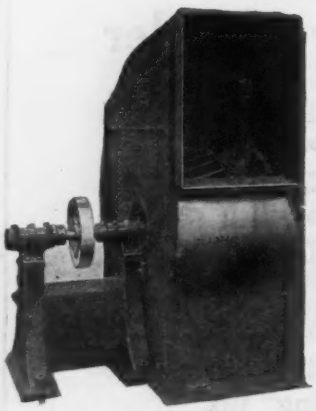
BUYERS! Cooledge Hygrade Paints and Varnishes are built up to the highest known standards, but to quantity buyers we can quote down to some very extraordinary low prices. Whatever your paint requirements let the big plant—the plant that is equipped to produce pure paints at lowest, honest costs—submit quotations that will help you cut your upkeep costs.

Manufactured by

F. J. Cooledge & Sons

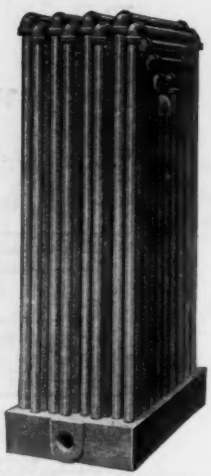
Atlanta **Charlotte** **Savannah**

A few of the mills boosting production with Buffalo Ventilating Systems



Niagara Conoidal Fan

Riverside and Dan River Cotton Mills
Consolidated Textile Corporation
Summerville Cotton Mills
Lancaster Cotton Mills
Elizabeth City Hosiery Co.
King Cotton Mills Corp.
Anniston Net & Twine Co.
Passaic Worsted Spinning Co.
Sidney Cotton Mills
Waterboro Cotton Oil Co.
American Spinning Co.
Pioneer Mill
Clark Thread Co.
Pacific Mills
Monarch Cotton Mills
Thread Mills Co.
Holeproof Hosiery Co.
Albany Cotton Mills
Seminole Mills
Langley Mills
Cannon & Co.
Avondale Mills
Glenwood Cotton Mills
Cheney Bros.
Mt. Hope Finishing Co.
Metz Co.
Mass. Cotton Mills
Greenville Finishing Co.
Passaic Cotton Mills
Beaver Brook Mills
Faulkner & Colony Mfg. Co.
Waterhead Mills
Jackson Mills



Buffalo Indirect Heater

Send for catalog No. 700-78

Buffalo Forge Company

460 Broadway, Buffalo, N. Y.

Electrical Service to Georgia

On General Electric Products

Our Atlanta and Savannah warehouses carry complete lines. Whatever your requirements — just so they are electrical— we can not only fill them, but insure prompt and efficient shipments.

We carry a particularly full line of textile mill equipment, illuminating units, lamps, motors, etc. Save yourself worry and inconvenience by drawing from our complete stock.

COMPLETE LINES OF

Wire
Conduit
Switches
Safety Devices
Fuses
Insulators
Lamps
Lighting Units
Fixtures
Fans
Street Lights
Motors
Brushes
Etc.
Anything Electrical

QUICK DELIVERY

CARTER ELECTRIC CO.

Distributors

ATLANTA SAVANNAH

ELECTRICAL SUPPLIES

GENERAL ELECTRIC CO.'S PRODUCTS—MOTORS, WIRE, WIRING DEVICES, ELECTRICAL, PORCELAIN CONDUIT AND FITTINGS, TRUMBULL SWITCHES.

Complete Stocks in Columbia for Prompt Shipment.

DISTRIBUTING GE JOBBER

PERRY-MANN ELECTRIC COMPANY

COLUMBIA, S. C.

Specialists!

This is the day of specialists, and important matters are no longer left to guess-workers. You call in a medical specialist when somebody is critically ill—you consult a lawyer over serious legal matters—you secure the services of big architects when considering a new mill.—SO—

You call in a specialist when considering an electrical system for your new mill or addition because it is a matter that is too important to leave to ordinary electrical contractors—important not only on account of the initial investment, but it must be planned to take care of future expansion, equipment purchased from the knowledge gained by experience of what equipment is best suited to the conditions and how long it will last, and then installed by men whose experience in textile mill work insures dependability and safety.

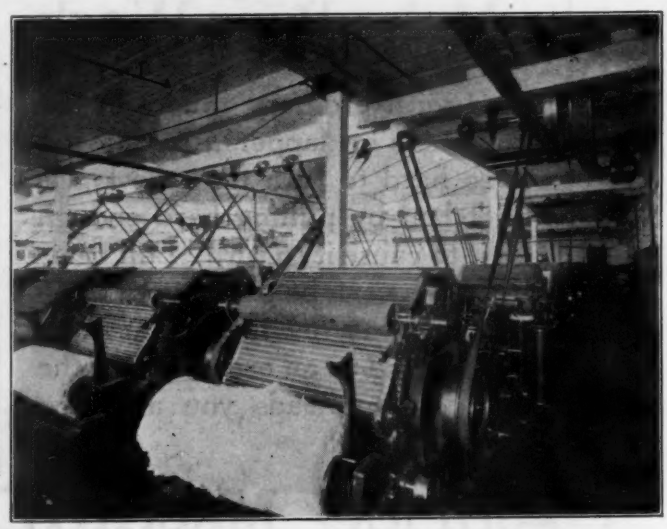
H. & G. Service means an electrical system economical, dependable, and satisfactory first and last.

HUNTINGTON & GUERRY
INC.,
GREENVILLE, S. C.

HUNTINGTON & GUERRY TROUBLE PROOF ELECTRICAL INSTALLATIONS

H & G TROUBLE-PROOF ELECTRICAL INSTALLATIONS

TEXTILE MOTORS



ALLIS-CHALMERS Type "AR" Squirrel Cage Motors fit into every requirement of the Textile Industry.

They are designed for both horizontal and vertical drive.

Their steel frame construction makes for an extremely rugged motor.

Positive and efficient ventilation results in uniform temperatures, avoiding "hot spots" so deteriorating to insulation.

For more detailed information send for bulletin.

30 H.P., 1200 R.P.M., Type "AR" Motor driving Carding Machines

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN, U.S.A.
District Offices in All Leading Cities.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

They never fail to back our claims

We claim that the Moccasin Bushing is the most reliable equipment you can install in your Textile Machinery, in loose pulleys or in any other bearing that has proved troublesome.

The Moccasin requires oiling but a few times yearly. It supplies clean, filtered oil to the bearing surfaces. It minimizes friction and lasts indefinitely.

These are our claims and

Moccasin Bushings

have backed them up to the letter.

Study the make-up and you will readily perceive the mechanical perfection of the Moccasin—will see why it is superior to any other bushing for high speeds and heavy loads. The phosphor bronze body is fitted with white pine oil feeding plugs, as shown in the cross section cut below. They function on the same principle as the lamp wick—capillary action—a law of nature as dependable as the law of gravity.

The oil is sealed in. There is no waste—no drippage to damage belting, floors or stock.

MOCCASIN BUSHING CO.
CHATTANOOGA, TENN.

CRESSON-MORRIS CO.

POWER TRANSMITTING MACHINERY

Merit Plus Recognition

"The heights by great men reached and kept were not attained by sudden flight."

Time, skill and effort must also precede merit as surely in machinery as in men.

Time, skill and effort must also precede merit in order to obtain and maintain for merit the recognition it deserves.

The great number of large installations of Cresson-Morris Power Transmitting Machinery is proof of both the merit and the recognition of the merit that nearly three score years of skill and effort have endowed it with.

The cumulative knowledge of all this experience is always available to you in the recommendations of our engineers.

CRESSON-MORRIS COMPANY
ENGINEERS—FOUNDERS—MACHINISTS
PHILADELPHIA, PENNA.

Stretched Laps Make Poor Work

And with ordinary rollers in the lap heads on lappers, the lap rod is so hard to turn that the lap is stretched by pulling hard enough on it to cause it to turn. Ball bearing rollers can be put in your present heads in a few minutes at small cost. Send us an order, giving the kind of lap heads you are now using.

AldricH MachinE
Ball WorkS Bearings
Greenwood, S. C.

Made for maximum service not merely the average

TRADE JENKINS MARK

Jenkins Bros

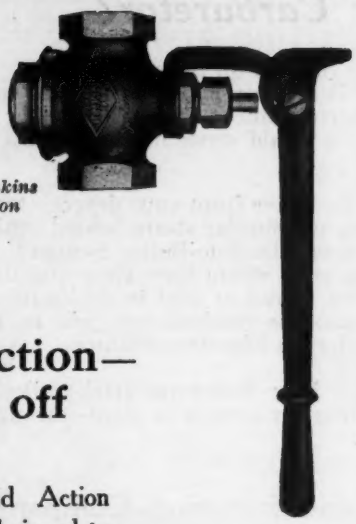
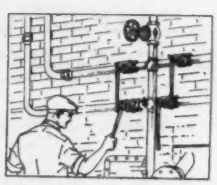


Fig. 720 Jenkins Rapid Action Valve

For rapid action— on and off

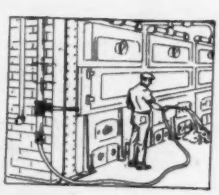
The Jenkins Rapid Action Valve is primarily designed to save time. It also saves water. When the operating lever is hanging freely, the valve disc is firmly held to its seat by the Heavy phosphor bronze spring and the existing water pressure. A quick upward quarter pull of the lever causes the valve spindle to force the disc off its seat. Opening the valve is instantaneous. A slight pull on the lever, and the valve instantly closes, without water hammer, or any pounding or rumbling in the piping.

On water lines to dyeing vats and tubs



For soot blowers in connection with boiler cleaning

Made in sizes ½ to 2½ inches. Write our nearest office for the "Rapid Action Valve" folder.



For quenching ashes

JENKINS BROS.

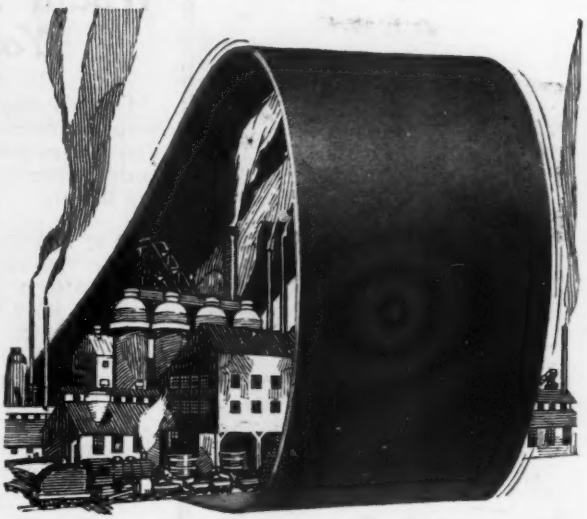
80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 No. Seventh Street..Philadelphia, Pa.
646 Washington Boulevard... Chicago, Ill.

Always marked with the "Diamond"

Jenkins Valves

SINCE 1864

Nothing takes the place of Leather



So that you may *know*

ONE belt gives you years of unfaltering service. Another is useless after a few power-wasting months.

There is a mighty difference between them. Yet when new they look alike. Appearance cannot tell you which will wear. How will you *know?* This was the problem which years ago led to the Graton & Knight Standardized Series—the one sure guide to definitely known belting service.

What is the "Standardized Series"?

The Standardized Series is a grouping of brands of Graton & Knight Leather Belts. These brands include exactly the right belt for practically every transmission job. Each brand is made to rigid specifications for lasting service on its particular type of drive.

Each brand is so carefully standardized throughout its manufacture that two belts of the same Standardized Series brand are always alike.

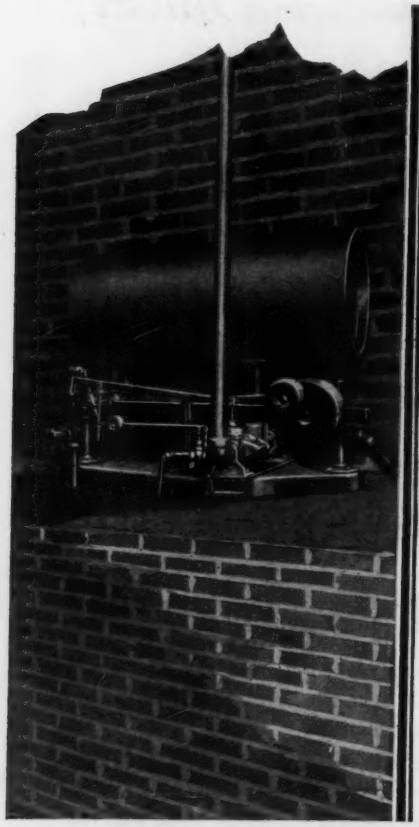
Graton & Knight Standardized Series gives you always the right belt for the right job. Tough, pulley-hugging belts of honest, rugged leather. Painstakingly made to give better power transmission.

Write for booklet 102-C, which gives full information about Standardized Series Belts for textile mills.

THE GRATON & KNIGHT MFG. CO., Worcester, Mass.

GRATON & KNIGHT

GRATON & KNIGHT
Standardized
LEATHER BELTING



Would You Leave Water In Your Carburetor?

Condensation in your steam lines is like water in your carburetor. It reduces efficiency—wastes fuel and causes poor performance. If you had water in your carburetor you would waste no time in draining it out.

Why not drain the water from your dryers, slashers, service heaters and similar steam heated equipment with a Morehead Back-to-Boiler System? It will not only keep your steam lines clear and dry, thus enabling every pound of coal to do its maximum work but also the condensation will be returned to your boilers at high temperature.

Write and learn how Morehead Back-to-Boiler Systems are effecting big savings in plants throughout the country.

Morehead Manufacturing Company

Dept. C, Grand River Ave. at Warren

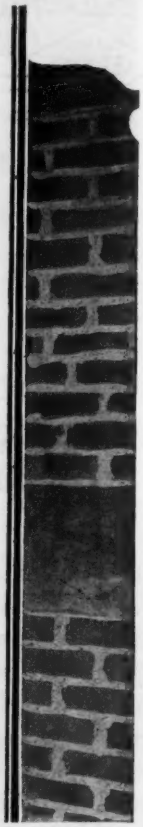
DETROIT MICHIGAN

(127)

Morehead

"BACK-TO-BOILER-SYSTEM"

POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS. DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE



BOILERS

of the

Water Tube and Tubular Types

OUR SPECIALTY

WALSH & WEIDNER BOILERS with our improved Steel Casing make the ideal Steam Plant. The cost of installation is moderate, the plant looks neat, cost of repairs is slight and they will save from 10 to 25% of your fuel bill.

We also manufacture Tanks of all description, Towers and Tanks, Steel Stacks, Steel Breeching, Smokestacks, Structural Steel and Plate Steel Work.

Write for our new catalog.

The Walsh & Weidner Boiler Co.

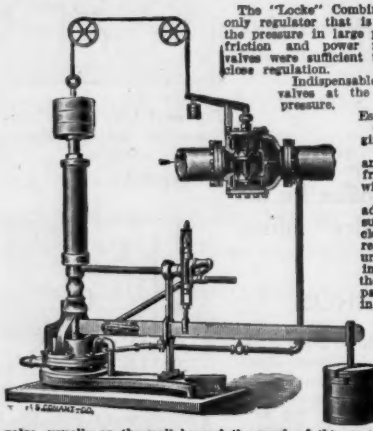
CHATTANOOGA, TENN.

New York Chicago San Francisco Memphis Havana
Kansas City Jacksonville New Orleans

TRADE LOCKE MARK

Established in 1871

LOCKE COMBINATION PRESSURE REGULATOR



The "Locke" Combination Regulator is the only regulator that is capable of controlling the pressure in large pipes, as heretofore the friction and power required to move the valves were sufficient to defeat all efforts at close regulation.

Indispensable for controlling large valves at the slightest variation of pressure.

Especially adapted for—

Controlling blower engines for forced draft.

No amount of resistance caused by dirt or friction will interfere with its close regulation.

It is also especially adapted for high pressure work and is the closest working pressure regulator we manufacture. It has been found impossible to construct these regulators in a compact form, as the heat in and about the large steam pipes soon works destruction to all the delicate regulating mechanism. For this reason the regulator proper is constructed so that it can be set at a distance from the valve, usually on the wall beyond the reach of this destructive agency. It will be found that this arrangement is indispensable, as has been fully demonstrated by trial.

The valve is so constructed that it will not only act as a reducing valve but will keep a guard over its source of supply and if boiler pressure should be reduced below a certain point it will close the valve no matter how great the demand is for steam. It will again open when pressure rises above this certain point, again resuming its duty as a regulator.

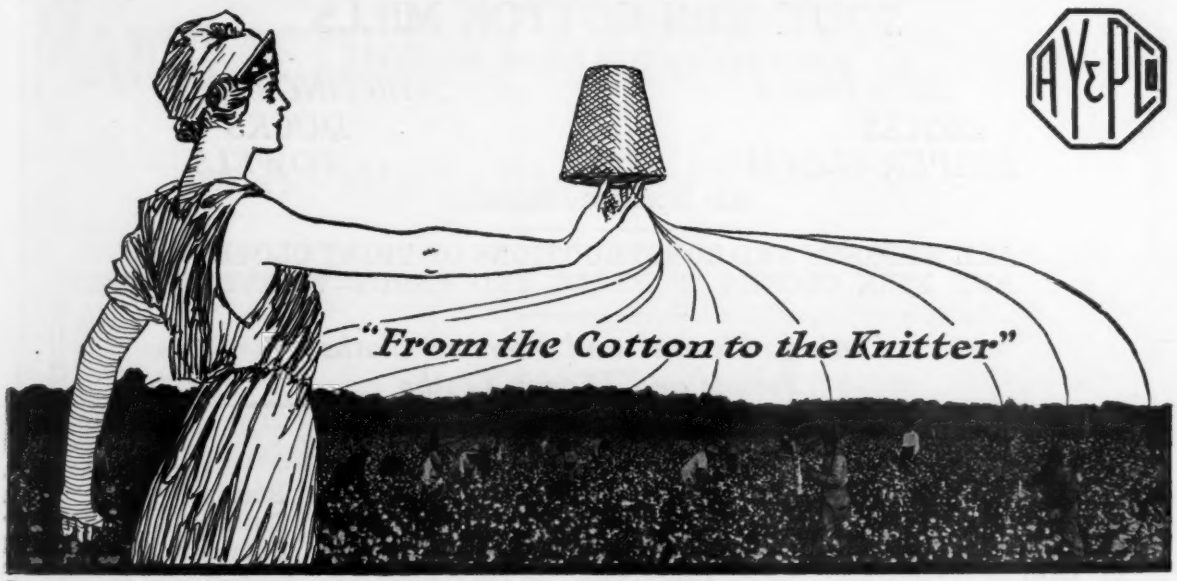
LOCKE REGULATOR CO., Salem, Mass.

Southern Representative: J. C. Lydon, 907 S. Tryon St., Charlotte, N. C.

New York Representatives: Rowland & Burns, 39 Cortlandt St.

No other Agency or Representative in New York City.

Commission Merchants, Yarn Dealers, Cotton Dealers and Brokers, Banks, Etc.



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SPINNERS AND MERCERIZERS
HIGH GRADE COMBED AND CARDED YARNS—16s to 80s
Our Mercerized Yarns Are the Product of Our Own Mills
General Office, Mt. Holly, N. C.
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Works, 2046-48 Amber Street,
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Cotton Mercerized Tapes, Spool Tapes, Bindings and Narrow Fabrics for Underwear and other Trades.

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For Weaving, Knitting and all Purposes.
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And Every Description of Linen Thread and Twine
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43 and 45 Worth Street, New York

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SOUTHERN COTTON MILLS

Manufacturing Well Known Brands of

SHEETINGS *SHIRTINGS*
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ALL WEIGHTS AND CONSTRUCTIONS OF PRINT CLOTHS AND FINE CLOTHS IN PLAIN AND FANCY WEAVES.

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Durham Hosiery Mills

Fifteen Modern Plants in North Carolina Converting Raw Materials Into Finished Hosiery.

DAILY CAPACITY EXCEEDS
25,000 Dozen Pairs of Hosiery
FOR
MEN, WOMEN AND CHILDREN

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INCORPORATED

MAIN OFFICE

Greenville, S. C.

COTTON

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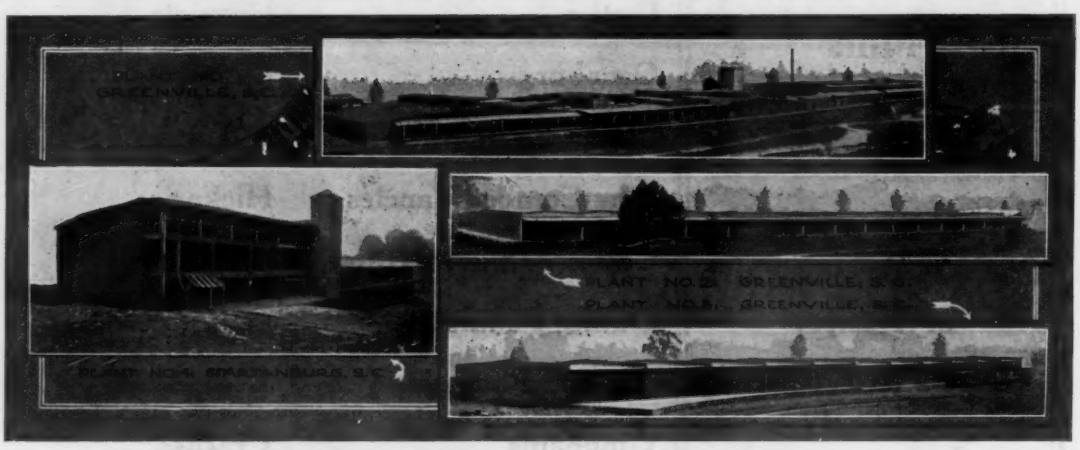
Seneca, S. C.	Macon, Ga.	Norfolk, Va.

Piedmont Bonded Warehouse & Compress Co., Inc.

Capital $500,000. — Capacity 100,000 Bales



OVER 500,000 bales of cotton are consumed annually within a radius of 50 miles of this Warehouse.
Situated in the midst of the great Cotton Manufacturing district of the Carolinas.
Facilities for distributing Mill Cotton are unsurpassed.
Have re-shipping facilities without additional cost, from all points throughout the Cotton States South and West of Atlanta, Georgia.
Its receipts are well and favorably known to all Southern, Eastern and Western Banks.
Warehouses are protected with Sprinkler System, which guarantees best insurance rates.
Our rates for services rendered patrons are reasonable.
For farther information, apply to

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JUDSON MILLS

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Fine and Fancy Cotton and Silk Mixed Goods

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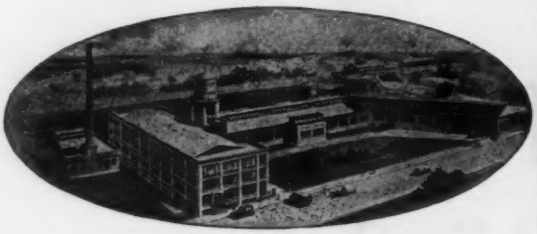


View of our Mercerizing and Bleaching Plant

BOGER & CRAWFORD

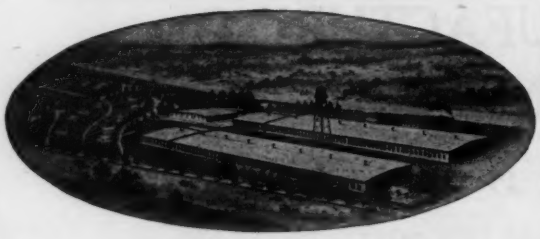
Established 1908

Spinners, Bleachers, Dyers and Mercerizers of High Grade Combed Yarns

By using our Spinning and Mercerizing you are always assured of a standard product.

"From the Cotton Field Direct to You"

Main Office, Factory and Warehouse
J and East Venango Sts., PHILADELPHIA



Spinning Mills, Lincolnton, N. C.

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Special Constructions
Cotton Fabrics

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Our reports of audit and our certificates on condition and operations are known and have weight in the financial centers of the world.

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ATLANTA, GEORGIA

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MOSS-McDUFFIE & CO.

COMMISSION MERCHANTS
Akron, Ohio

THIS concern is at all times in touch with a big demand for Osnaburgs, Sheetings and Ducks and their services are offered to a few more Southern Mills.

We can render unusual marketing service and will assure the right mills of a constant and direct contact with a large, favorable market.

References furnished.

Correspondence Invited

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COMBED and CARDED
WHITE MIXTURES AND COLORED
FOR
KNITTING
WEAVING
BRAIDING
AND
ELECTRICAL INSTALLATION

We solicit accounts
Wire or write us any offerings.

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ESTABLISHED 1872

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NEW ORLEANS

HENRY BEER
J. WILLIAM BARKDULL
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MEMBERS OF
New Orleans Cotton Exchange
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New York Cotton Exchange
New York Coffee Exchange
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Associate Members of the Liverpool Cotton Association

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CLASSIFIED ADVERTISING

RATES

DISPLAYED.

"For Sale" and all other advertisements using bold face type or otherwise displayed, $2.00 per inch per insertion.

Rates for larger spaces furnished on application.

WITHOUT DISPLAY.

"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements, 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(*When replies are to be received in our care, allow four words for box address,*)

SOUTHERN POSITION WANTED.

I would like a position as Overseer—Spoolers, Warpers, Winders, Twisters. I am at present an Overseer in New England. I have worked in the finest mills in the North. American, age 28, married, can furnish the best of recommendations. Address Box 115, care of COTTON, Grant Bldg., Atlanta, Ga.

POSITION WANTED

Manager or Superintendent of underwear mill. Fifteen years experience. Textile education. Part of time in charge of branch plants successfully handling mill office, costs, production and personnel. Thirty-seven years of age.

Address Box 114, care of COTTON, Atlanta, Ga.

BOSS SPINNING

I WANT AN OVERSEER'S JOB.

I am employed at present as Overseer of Spinning in the North, but running on short time. I would like a change. I am employed in the finest mill in the North, counts from 30's to 70's, O. N. C. O. 1-16 stock. Best of references. Address Box No. 116, care of COTTON, Grant Building, Atlanta, Ga.

WANTED

Experienced Paint Representative

A large well-known paint manufacturer desires a representative to handle their sales among the Southern textile mills. Must be a man with experience in selling paint to the textile mills, and one with ability to manage business in the Southern territory. Remuneration will be more than satisfactory. State full qualifications in first letter.

Address Box W. J. R., c/o COTTON, 1020 Grant Building, Atlanta, Ga.

I Want A Position In a Southern Mill

Have been in the mill for eighteen years, and have been overseer of carding for eight years.

At present I am overseer in a fine combed yarn mill making yarns of very good quality.

I am in New England, however, and the conditions do not suit me.

Am an American, 35 years of age, and will furnish satisfactory references.

Will take the place of overseer in a large mill, or would like superintendency of a small plant, more preferably a combed yarn proposition.

If you need a man of this kind, address

Box 109,
Care COTTON,
Grant Bldg., Atlanta, Ga.

SALESMEN covering the textile and allied trades, we have a very attractive and money-making proposition for you. Does not interfere with your present line. Not a selling proposition. Address box 118, care of COTTON, Grant Bldg., Atlanta, Ga.

WANTED

Position as expert carder with qualities for Asst. Supt. Physical Culture, Band or Orchestra Work.
Address

Box 117, care of COTTON, Grant Bldg. Atlanta, Ga.

New and Second Hand

ENGINES

Corliss Automatic and Slide Valve

BOILERS

Pumps, Hoisting Engines, Gas and Gasoline Engines.

MACHINE TOOLS

Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING

Planers, Molders, Band Saws, etc.

ELEC. MACHINERY

Dynamos and Motors

AND SUPPLIES OF ALL KINDS

FRANK TOOMEY, Inc.,
127-31 N. Third St.,
Philadelphia, - Pennsylvania

Do You Want to Sell It?

Probably you, like many other mills, have some equipment which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand equipment at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment

to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON

GRANT BUILDING ATLANTA, GA.

DESIRABLE EQUIPMENT

OFFERED AT ATTRACTIVE PRICES

Pumps

6—16″ Allis-Chalmers type S, Centrifugal, direct connected to turbine.
4—14″ Allis-Chalmers type S, Centrifugal, direct connected to turbine.
5—14″ Worthington Class B Centrifugal direct connected to motor.
10—25 and 38 x 4½ x 24 Worthington tandem compound duplex.
70—5″ Gould belt driven centrifugal.
20—4″ Baker belt driven centrifugal.
5—2½″ American Type A, belt driven centrifugal.
10—25 and 38 x 4½ x 24 Worthington tandem compound duplex.
3—8″ 3-stage Alberger-Curtis steam turbine driven boiler feed pumps.
18—6 x 2½ x 6 Worthington duplex pumps.

Boilers

17—823 h.p. Stirling water tube boilers, class M-30, Babcock & Wilcox, 200 lbs. pressure. Complete with Westinghouse stokers, forced draft fans, Vulcan soot blowers, and all accessories.
2—300 h.p. Heine boilers, 150 lbs. pressure. Murphy stokers and accessories.

Blowers and Fans

1—Buffalo forced draft fan, type TD-9½ 100,000 cu. ft. capacity. Direct connected to 225 h.p. Moore steam turbine and reduction gear. Mounted on common base.
8—24″ Buffalo exhaust fans with motors.
8—30″ Buffalo exhaust fans with motors.
2—Connersville blowers, double outboard bearing. Capacity 24.5 cu. ft. per revolution, 3,200 cu. ft. per minute at 255 r.p.m. Maximum pressure 4.58 lbs. per sq. in. at 255 r.p.m.
1—Roots Style D high pressure type blower. Capacity 890 cu. ft. per minute at 435 r.p.m. Maximum pressure 9 lb. per sq. in. at 435 r.p.m.

Cotton Treating Machinery

20—Six section, No. 24, 8-ft. cotton dryers, equipped with model "M" self feeder. Automatic sprinklers, 12,556 sq. ft. heating surface to dryer. Mfg. by Sargent's Sons Corp.
20—Mixing pickers, mfg. by Sargent's Sons Corp. Cylindrical type. Capacity 600 to 800 lbs. per hour.
20—48″ Cotton washers or rinsers. Complete with cast iron frame, pans, squeeze rolls, picker and conveyor. Right and left hand available.
8—Noble & Wood Co. concentrators, octagon cylinder, diameter 44″, length 42″. Vat 4′1¼″ wide, 6′9″ long, 2′9″ high.
35—Welded steel digesters, maker Continental Iron Works. Capacity 1300 cu. ft. Pressure 110 lbs.

Conveyors

3—42″ Link-Belt apron feeders, 30′ centers.
4—42″ Link-Belt apron feeders, 10′ centers.
1—24″ Link-Belt conveyor, 110′ centers.
2—24″ Link-Belt conveyors, 180′ centers.
1—24″ Link-Belt conveyor, 225′ centers.
1—24″ Link-Belt cross-section, 66 ft.

Accumulators and Compressors

2—42 x 11½ Hydro-pneumatic accumulators for 300 lbs. air service. Equipped with Watson-Stillman automatic regulators.
2—15 and 26 x 20 x 24 Compound Duplex Laidlaw compressors. Pressure 80 lbs. Capacity 2,570 cu. ft. at 150 r.p.m.
2—9½ x 5 x 10 right and left hand, air jacketed, steam driven compressors. Operate at 150 lbs. pressure. Receive air at 120 lbs. pressure and deliver at 300 lbs.

Steel Tanks

30—20′ x 12′ vertical storage tanks ⅛-$\frac{3}{16}$″ plates 28,200 gal. cap.
42—9′6″ x 9′6″ vertical storage tanks ⅝″ plates, 5,120 gal.
27—8′ x 30′ Pressure tanks ⅞″ plates 11,280 gal.
7—8′ x 20′ Horizontal pressure tanks ½″ plates 7,520 gal.
38—4′6″ x 4′10″ Vertical open tanks $\frac{3}{16}$″ plates 510 gal.
Write for Bulletin No. 7 listing over 500 steel tanks.

Valves and Fittings

Crane, Chapman and Walworth.
250—2″ Standard Flanged Gate Valves.
300—3″ Standard Flanged Gate Valves.
450—4″ Standard Flanged Gate Valves.
100—4″ Standard Flanged Globe Valves.
100—2½″ Extra Heavy Screwed Globe Valves.
50—3″ Extra Heavy Flanged Gate Valves.
30—3″ Extra Heavy Flanged Globe Valves.
100—4″ Everlasting Blow-off valves.
400—2″ Extra Heavy C. I. Companion Flanges.
400—3″ Extra Heavy C. I. Companion Flanges.
2000—4″ Standard C. I. Companion Flanges.
1500—4″ C. I. Standard Flanged Ells.
400—6″ C. I. Standard Flanged Ells.
2500—3″ Standard C. I. Flanged Tees.
900—6″ Standard C. I. Flanged Tees.
Write for list of Complete Stock.

Corliss Engines

7—18″ x 36″ Allis-Chalmers 350 h.p. Corliss engines. Heavy duty mill type.

MOTORS AND TRANSFORMERS

Used Motors

3 phase, 60 Cycle Motors.

Quan.	H.P.	Type	Volt	Speed	Make
1	¼	D.S.T.	440	1800	G.E.
1	½	KT112	440	1200	G.E.
5	½	B	440	1200	F.M.
29	7½	CS170931-A	440	1200	West.
37	7½	13 D	440	1200	A.C.
1	7½	3 M	440	1200	A.C.
2c	7½	1 Form	440	900	G.E.
5c	10		440	900	G.E.
1	10	17 G	440	1200	A.C.
2	15	17 C	440	1200	A.C.
8	15	17 K	440	1200	A.C.
2	15	17 D	440	1200	A.C.
3c	15		440	720	G.E.
1c	30	1 Form	440	900	G.E.
1	30	20 G	440	1800	A.C.
2	30	CS	440	1200	West.
6	30	KT 332	440	1200	G.E.
4cx	40	MT 336 y	440	1200	G.E.
2cx	40			1200	West.
2	75	CS160874A	440	1800	West.
5	75		440	720	G.E.
1	150	CS179274B	2200	1800	West.

Single Phase, 60 Cycle Motors

1	10	RI-627	220/110	1800	G.E.

All motors squirrel cage except those marked c which are slip ring. Motors marked cx are vertical slip ring.

Transformers.

Single Phase 60 Cycle

5	10 KVA	West.	Type S	2200/220/110
1	50 KVA	West.	Type S	2400/480/240
3	100 KVA	West.	Outdoor	6600/2200/2000
12	250 KVA	A.C.	Outdoor	2300/230/440
12	250 KVA	West.	Outdoor	2300/460
3	600 KVA	West.	Outdoor	600/1200/2400

volt primary (6600 volt secondary).

Motors and transformers are in excellent condition.

Prices and specifications gladly furnished.

NASHVILLE INDUSTRIAL CORPORATION

OLD HICKORY, TENNESSEE

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ACETYLENE GENERATING APPARATUS.
Oxweld Acetylene Co.

ACETYLENE WELDING APPARATUS.
(See Welding Apparatus.)

ACIDS.
(See Dyestuffs and Chemicals.)

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Ernst & Ernst.
La Frents & Co., F. W.

ACCOUNTING SYSTEMS.
Ernst & Ernst.

AERATING AND CLEANING MACHINE.
Murray Co., The.

AIR WASHERS.
American Blower Co.
Carrier Eng. Corp.
Parks-Cramer Co.

AIR COMPRESSORS.
(See Compressors.)

AIR CONDITIONING SYSTEMS
(See Humidifying Apparatus.)

ALBONE.
Roessler & Hasslacher Chemical Co.

ALKALIES.
(See Dyestuffs and Chemicals.)

ALUM.
(See Finishing and Sizing Materials.)

ANILINE COLORS.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE.
(See Dyestuffs and Chemicals.)

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Bond Co., Chas.

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Lockwood, Greene & Co.
McCrary Co., J. B.
Robert & Co.
Sirrine, J. E.

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(See Repairing—Electrical.)

ARTWORK.
Jacobs & Co.

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(See Coal and Ash Handing Machinery.)

ASPHALT SLATE SHINGLES.
(See Slate Asphalt Roofing.)

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La Frents & Co., F. W.

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(See Trucks—Auto.)

AUTOMATIC CONTROLLERS (TEMPERATURE).
(See Temperature Regulators.)

AUTOMATIC LOOM ATTACHMENTS.
(See Loom Attachments.)

AUTOMATIC FEEDS FOR COTTON.
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Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Sargent's Sons Corp., C. G.
Whitin Mch. Works.

AUTOMATIC SCALES.
(See Scales.)

AUTOMOBILES.
White Co.

AWNINGS.
Smith Mfg. Co.

BABBITT METAL.
Ryerson & Son, Inc., Jos. T.

BACKWASHERS.
Sargent's Sons Corp., C. G.

BAGS (COTTON PICKER).
Smith Mfg. Co.

BAGS (COIN OR MONEY).
Smith Mfg. Co.

BAGS (COAL).
(Smith Mfg. Co.

BALL BEARINGS.
Aldrich Mch. Works.
Dodge Mfg. Co.
Fulton Supply Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Skayef Ball Bearing Co.
Strom Ball Bearing Mfg. Co.

BALL BEARING HOUSINGS.
Aldrich Machine Works.
Fafnir Bearing Co.
Fulton Supply Co.
Strom Ball Bearing Mfg. Co.

BALE BAND BUCKLES.
(See Box Strappings & Buckles.)

BALE OPENERS.
(See Openers.)

BALING MACHINES.
Crompton & Knowles Loom Wks.
Draper Corporation.
Economy Baler Co.
Logemann Bros.
Saco-Lowell Shops.

BALING PRESSES.
(See Presses.)

BANDAGES, TAPES, ETC.
American Textile Banding Co.
Weimar Bros.

BANDAGE & TAPE MACHINES
Foster Machine Co.
Whitin Mch. Wks.

BANDS.
(See Tapes.)

BANKS.
American Trust Co.

BARS (IRON AND STEEL).
Ryerson & Son, Inc., Jos. T.

BAROMETERS.
Taylor Instrument Co.

BARRELS—FIBRE.
(See Fibre Products.)

BASKETS—MILL.
(See Boxes—Mill.)

BATH CABINET—SHOWER.
Durable Steel Locker Co.

BATTERIES (ELEC.)
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BEAMS.
Allen Co.
Moasberg Pressed Steel Corp.
U S Bobbin & Shuttle Co.

BEAM HEADS.
Allen Co.
Jordan Mfg. Co.
Moasberg Pressed Steel Corp.
U S Bobbin & Shuttle Co.

BEAMS (STEEL).
Ryerson & Son, Inc., Jos. T.

BEAMING AND WARPING MACHINERY.
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BEARINGS.
Aldrich Machine Works.
Cresson-Morris Co.
Dodge Mfg. Co.
Fulton Supply Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Moocasin Bushing Co.
Ryerson & Son, Inc., Jos. T.
Skayef Ball Bearing Co.
Strom Ball Bearing Mfg. Co.
Wicaco Screw & Mch. Works, Inc.

BELTING (LEATHER, CANVAS AND RUBBER).
American Supply Co.
Bond Co., Chas.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELTING—CHAIN.
Diamond Chain & Mfg. Co.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Morse Chain Co.

BELTING (ROUND—LEATHER).
Bond Co., Chas.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.

BELTING—ROPE.
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BELT CONVEYORS.
Dodge Mfg. Co.
Fulton Supply Co.
Link Belt Company.
Morse Chain Co.

BELT DRESSING.
Bond Co., Chas.
Dixon Crucible Co., Jos.
Fulton Bag & Cotton Mills.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT FASTENERS.
Clipper Belt Lacer Co.
Detroit Belt Lacer Co.
Flexible Steel Lacing Co.
Fulton Supply Co.

BELT LACING (LEATHER).
Bond Co., Chas.
Dodge Mfg. Co.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT TIGHTENERS.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Rhoads & Sons, J. E.

BELT TIGHTENER DEVICE FOR CONE PICKERS.
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Allen Co.

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Butterworth & Sons Co., H. W.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machry. Co.
Woolford Wood Tank Co., G.

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Carrier Eng. Corp.
General Electric Co.
Philadelphia Drying Mchry. Co.
Westinghouse Elec. & Mfg. Co.

BLOWPIPES (BRAZING, CUTTING, WELDING).
Oxweld Acetylene Co.

BOBBINS.
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Draper Corporation.
Fulton Supply Co.
Jordan Mfg. Co.
Lestershire Spool & Mfg. Co.
Parker Co., Walter L.
Shambow Shuttle Co.
Smith Bobbin Wks., L. C.
Textile Products Co.
U S Bobbin & Shuttle Co.
Whitin Machine Works.

BOBBIN HEADS.
Brown Co., David.
Jordan Mfg. Co.
Smith Bobbin Wks., L. C.
Textile Products Co.
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BOBBIN STRIPPERS.
Crompton & Knowles Loom Works.
Terrell Machine Co.

BOILERS.
International Engineering Wks., Inc.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Toomey, Frank.
Walsh & Weidner Boiler Co.

BOILER COMPOUNDS.
Dixon Crucible Co., Jos.

BOILER FEED WATER PURIFICATION.
Hungerford & Terry, Inc.

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American Blower Co.
Crane Co.
Dixon Crucible Co., Jos.
Fulton Supply Co.
International Engineering Co.
Jenkins Bros.

BOILER GRATES AND STOKERS.
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BOILER TUBES AND FITTINGS.
Ryerson & Son, Inc., Jos. T.

BOLTS AND NUTS.
Ryerson & Son, Inc., Jos. T.

BONDS AND STOCKS (TEXTILE MILL).
American Trust Co.

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Haskins Co., R. G.
Morris & Co., Inc.
Smith Mfg. Co.

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BRICK (BUILDING & PAVING).
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BROKERS—STOCK.
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Mason Brush Wks.

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Dixon Crucible Co., Jos.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Morris & Co., Inc.
Smith Mfg. Co.

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Link-Belt Company.

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Dowman, George.
Truscon Steel Co.

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Cooledge & Sons, F. J.
Detroit Graphite Co.
Dixie Portland Cement Co.
Dowman, George.
Dufur & Co.
Hascall Paint Co.
Kirkpatrick Lumber & Timber Co.
Minter Homes Co.
Murphy's Sons, C. P.
National Paving Brick Mfg. Asso.
Richardson Co.
St. Louis Surfacer & Paint Co.
Sonneborn Sons, Inc., L.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
Truscon Steel Co.
Ware Paint Co.

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BUSHINGS.
Moocasin Bushing Co.
Southern Spindle & Flyer Co.

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Butterworth & Sons Co., H. W.
Grand Rapids Textile Mchry. Co.
Textile Finishing Mchry. Co.

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CALLING SYSTEM—INTER-TELEPHONE.
Carter Electric Co.

CAMPING EQUIPMENT, FURNITURE, STOVES, LIGHTS, ETC.
Smith Mfg. Co.

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CANS—ROVING
Haskins Co., R. G.

CARS AND TRUCKS—FIBRE.
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Wiggins Co., John B.

CARBON BURNING APPARATUS.
Oxweld Acetylene Co.

CARBON RODS AND PASTE (WELDING).
Oxweld Acetylene Co.

CARBONIZING MACHINERY.
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Klauder-Weldon Dyeing Machine Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Mchry. Co.
Tolhurst Mch. Works.

CARDING MACHINERY AND SUPPLIES.
Gessner, David
Howard & Bullough.
Proctor & Schwartz, Inc.
Roy & Son, B. S.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

CARD & NAPPER CLOTHING.
Howard Bros. Mfg. Co.

CARD FEEDS.
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Proctor & Schwartz, Inc.
Schofield Co., Wm.
Whitin Machine Co.

CARD GRINDING MACHINERY.
Proctor & Schwartz, Inc.
Roy & Son, B. S.
Whitin Machine Works.

CARPET MACHINERY.
Butterworth & Sons Co., H. W.
Crompton & Knowles Loom Works.
Gessner, David
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Schofield, Wm., Co.
Textile Finishing Mchry. Co.

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Curtis Pneumatic Machry. Co.
Louden Machinery Co.
Mathews Conveyor Co.

CASES—WOODEN.
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CASTINGS—IRON
Briggs, Schaffner Co.
Cresson-Morris Co.
Lombard Fdry. & Mch. Co.
Piedmont Iron Works
Rome Machine & Fdry. Co.
Walsh & Weidner Boiler Co.

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Truscon Steel Co.

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Detroit Graphite Co.
Dixon Crucible Co., Jos.
Hockaday Co.
Sonneborn Sons, Inc., L.
Wadsworth, Howland & Co., Inc.
Ware Paint Co.

CENTRAL STATION (ELECTRIC).
Tennessee Electric Power Co.

CENTRIFUGALS.
Cresson-Morris Co.
Fletcher Works.
Goulds Mfg. Co.
Schaum & Uhlinger.
Tolhurst Mch. Wks.

CHAIN DRIVES.
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CHAIN—BLOCK, BICYCLE, AUTO, ENGINE, AGRICULTURAL, ETC.
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CHLORINE GAS.
Electro Bleaching Gas Co.
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Best & Co., Edw. H.
Phila. Felt Co.

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Allis-Chalmers Mfg. Co.
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CLUTCH LININGS.
Carlyle-Johnson Mch. Co.

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Curtis Pneumatic Mchry. Co.
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Proctor & Schwartz, Inc.
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Mathews Gravity Carrier Co.

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Wellington, Sears & Co.
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Southern Wood Preserving Co.

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Jacobs & Co.

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Oxweld Acetylene Co.

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Jacobs & Co.

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Howard & Bullough.
Saco-Lowell Shops.
Whitin Machine Works.

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Mills Co.

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Buffalo Forge Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.

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Butterworth, H. W., & Sons Co.
Gessner, David
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Philadelphia Drying Mchry. Co.
Phila. Metal Drying Form Co.
Proctor & Schwartz, Inc.
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Textile Finishing Machinery Co., The.
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Bancroft & Sons Co., Jos.
Boger & Crawford.
Dixie Mercerizing Co.
Franklin Process Co.
Sayles Finishing Plants, Inc.
United Piece Dye Works.
U. S. Finishing Co.

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Emerson Apparatus Co.
Firsching, J. A.
Fletcher Works.
Franklin Process Co.
Fulton Co.
Gessner, David
Grand Rapids Textile Mchry. Co.
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Klauder-Weldon Dyeing Mch. Co.
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Rome Machine & Fdry. Co.
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Franklin Process Co.

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(See Tanks or Bleaching Kiers.)

DYESTUFFS AND CHEMICALS).
American Diamalt Co.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
DuPont de Nemours & Co., E. I.
Ciba Co., Inc.
Electro Bleaching Gas Co.
Fleischmann Co., The.
Ford Co., J. B.
Grasselli Chemical Co.
India Alkali Works.
Kali Mfg. Co.
Klipstein & Co., A.
Lennig & Co., Chas.
Mathieson Alkali Works, Inc.
Metz & Co., H. A.
National Aniline & Chemical Co.
Newport Chemical Wks.
Quaker City Chemical Co.
Roessler & Hasslacher Chemical Co.
New Brunswick Chemical Co
Penick & Ford Sales Co., Inc.
Rohm & Haas Co.
Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stein, Hall & Co.
Surpass Chemical Co.
United Chemical Products Corp.
Wolf & Co., Jacques.

ELECTRIC CONDUIT AND FITTINGS.
(See Electrical Machinery and Supplies.)

ELECTRIC DYNAMOS AND MOTORS.
(See Motors and Generators.)

ELECTRIC FANS.
(See Fans—Electric.)

ELECTRIC LAMPS.
(See Lamps.)

ELECTRIC LAMP GUARDS.
Perry-Mann Electric Co.
Southern Elec. Supply Co.

ELECTRICAL ENGINEERS AND CONTRACTORS.
Huntington & Guerry, Inc.
McCrary Co., J. B.
Panton, Harrison D.
Perry-Mann Electric Co.

ELECTRIC NEUTRALIZERS.
Chapman Electric Neutralizer Co.

ELECTRIC LIGHTING ENGINEERS.
(See Illuminating Engineers.)

ELECTRICAL MACHINERY, INSTRUMENTS AND SUPPLIES.
Allis-Chalmers Mfg. Co.
American Blower Co.
Buffalo Forge Co.
Carter Electric Co.
Chapman Electric Neutralizer Co.
Cooper Hewitt Electric Co.
Curtis Co., The.
Elwell-Parker Electric Co.
Fulton Supply Co.
General Electric Co.
Independent Pneumatic Mchry. Co.
Perry-Mann Electric Co.
Southern Elec. Supply Co.
Walsh & Weidner Boiler Co.
Westinghouse Elec. & Mfg. Co.

ELECTRIC POWER.
(See Power.)

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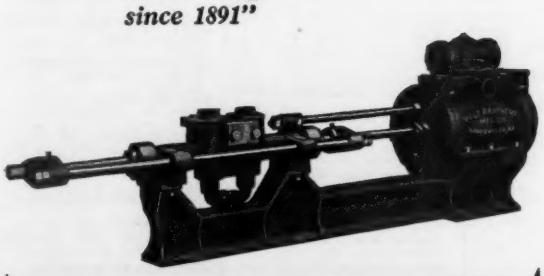

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A. E. Singleton, *Manager.*

BUYERS' INDEX—Continued.

ELECTRIC TRACTORS AND TRUCKS.
(See Tractors and Trucks—Electric.)

ELECTROTYPES.
Jacobs & Co.

ELEVATORS—PORTABLE.
Mathews Gravity Carrier Co.

ELEVATORS.
Link-Belt Company.
Mathews Gravity Carrier Co.

ENAMELED IRON AND GLASS FOR TEXTILE MACHRY.
Mitchell-Bissell Co.

ENAMEL—MILL WHITE.
(See Paint.)

ENGINEERS—MILL.
(See Architects.)

ENGINES—OIL, GAS AND GASOLINE.
Allis-Chalmers Mfg. Co.
Fulton Supply Co.

ENGINES (STEAM).
Allis-Chalmers Mfg. Co.
American Blower Co.
Fulton Supply Co.
Lombard Iron Works & Supply Co.
Toomey, Frank.

ENGINE ROOM APPLIANCES AND SUPPLIES.
American Blower Co.
Fulton Supply Co.
Jenkins Bros.
Locke Regulator Co.
Lunkenheimer Co.
Westinghouse Elec. & Mfg. Co.

ENGINE STOP AND SPEED LIMIT SYSTEMS.
Locke Regulator Co.

ENGINEERS (CONSULTANT AND EFFICIENCY).
Ernst & Ernst.

ENGINEERS, CONTRACTORS & BUILDERS (SANITARY & PAVING).
McCrary Co., J. B.

ENGINEERS (TEXTILE AND MECHANICAL CONSULTING).
Panton, Harrison D.

ENGINEERS (MECHANICAL).
Bird-Potts & Co., Inc.

ENGRAVINGS AND CUTS.
Jacobs & Co.

ETCHING—PRINTING.
Jacobs & Co.

EXHAUSTERS.
(See Blowers.)

EXPORTERS—COTTON.
(See Brokers.)

EXTRACTORS—HYDRO.
American Laundry Mchry. Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Machine Works.

FACTORY AND INDUSTRIAL SITES.
(See Industrial Sites.)

FACTORY MANAGEMENT SYSTEMS.
Ernst & Ernst.

FANS—ELECTRIC.
American Blower Co.
Buffalo Forge Co.
Carter Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

FANS—CONVEYING, POWER AND EXHAUST.
(See Blowers and Blowing Systems.)

FASTENERS—BELT.
(See Belt Fasteners.)

FEED WATER PURIFIERS.
(See Boiler Feed Water Purification.)

FEEDERS.
(See Automatic Feeders.)

FELTING MACHINERY.
Proctor & Schwartz, Inc.

FENCE—STEEL AND IRON.
Cyclone Fence Co.
Dowman, George.

FENCE POSTS—CREOSOTED PINE.
Southern Wood Preserving Co.

FILLETS (CYLINDER DOFFER, BURNISHER AND STRIPPER).
Howard Bros. Mfg. Co

FILLING—CAP AND WARP.
U S Bobbin & Shuttle Co.

FILM (MOTION PICTURE).
(See Theatre Equipment.)

FILTERS—OIL.
Bowser & Co., Inc., S. F.

FILTERS—WATER.
Hungerford & Terry, Inc.

FILTERS (ALUM).
Lennig & Co., Chas.

FILTER CLOTHS.
Smith Mfg. Co.

FINISHING.
(See Dyers, Bleachers and Finishers.)

FINISHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machry.)

FINISHING, BLEACHING AND SIZING MATERIALS.
American Diamalt Co.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Corn Products Refining Co.
DuPont de Nemours & Co., E. I.
Electro Bleaching Gas Co.
Fleischman Co., The.
Ford Co., J. B.
India Alkali Works.
Kali Mfg. Co.
Keever Starch Co.
Klipstein & Co., A.
Lennig & Co., Chas.
Mathieson Alkali Works, Inc.
Metz & Co., H. A.
National Aniline & Chemical Co.
Newport Chemical Works.
New Brunswick Chemical Co.
Penick & Ford Sales Co., Inc.
Quaker City Chemical Co.
Roessler & Hasslacher Co.
Rohm & Haas Co.
Somneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stein, Hall & Co.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

FIRE DOORS AND HARDWARE.
Dowman, George.
Truscon Steel Co.

FIRE HOSE.
(See Hose—Fire.)

FIRE PROTECTING PAINT.
(See Paint.)

FLAT STEEL HEDDLES.
Steel Heddle Mfg. Co.

FLAX SPINNING.
U S Bobbin & Shuttle Co.

FLEXIBLE COUPLNGS.
Allis-Chalmers Mfg. Co.
Cresson-Morris Co.

FLOOD LIGHTS—ELECTRIC.
Cooper Hewitt Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

FLOORS (TAR CONCRETE).
Murphy's Sons, C. P.

FLOORING LUMBER.
Kirkpatrick Lumber & Timber Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

FLOORING—WOOD BLOCKS.
Southern Wood Preserving Co.

FLOOR SCRUBBING MACHINE
American Scrubbing Equipment Co.

FLOOR SCRUBBING POWDERS.
(See Scrubbing Powders.)

FLOOR SWEEPS.
(See Brushes.)

FLUTED ROLLS.
Howard & Bullough.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

FLUX (WELDING).
Bird-Potts Co., Inc.
Oxweld Acetylene Co.

FLYERS.
Howard & Bullough.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

FOLDING & TURNING MACHINERY.
Foster Machine Co.
Grand Rapids Textile Mchry. Co.

FOUNDERS.
Briggs-Schaffner Co.
Cresson-Morris Co.
Lombard Fdy. & Mch. Wks.

FOUNTAINS—DRINKING.
Murdock Mfg. & Supply Co.
Bundle-Spence Mfg. Co.

FRICTION CLUTCHES.
(See Clutches—Friction.)

FURNITURE (FOLDING—CAMP).
Smith Mfg. Co.

FURNITURE—MILL.
Durabilt Steel Locker Co.
Mills Co.
Smith Mfg. Co.

FUSES—ELECTRIC.
Carter Electric Co.
Fulton Supply Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.

GARAGES (PORTABLES—METAL).
Dowman, George.

GARNETT MACHINES.
Proctor & Schwartz, Inc.

GAS ENGINES.
(See Engines—Gas.)

GASOLINE .LIGHTING .SYSTEMS, LANTERNS, ETC.
Smith Mfg. Co.

GASOLINE CAMP STOVES.
Smith Mfg. Co.

GAUGES—STEAM PRESSURE, ETC.
Fulton Supply Co.
Foxboro Co., Inc.
Taylor Instrument Co.

GAUGE—OIL.
Fulton Supply Co.
Lunkenheimer Co.

GAUGES (LIQUID LEVEL).
Foxboro Co., Inc., The.
Lunkenheimer Co.
Taylor Inst. Co .

GAUGES—WATER.
Fulton Supply Co.
Lunkenheimer Co.

GEARS—
Dodge Mfg. Co.
Fulton Supply Co.
General Electric Co.
Link-Belt Company.
Morse Chain Co.
Piedmont Iron Works

GEAR BLANKS.
Piedmont Iron Works.
Wicaco Screw & Mch. Wks., Inc.

GEAR CUTTING AND CUTTERS.
Cresson-Morris Co.
Piedmont Iron Works.

GEAR PULLERS.
General Electric Co.

GENERATORS—ELECTRIC.
(See Motors and Generators.)

GLOVES (ASBESTOS).
Oxweld Acetylene Co.

GOGGLES (WELDING).
Oxweld Acetylene Co.

GLASSWARE AND DISHES
(See Dishes.)

GOVERNORS—PUMP.
General Electric Co.

GRAPHIC CHARTS.
Ernst & Ernst.

GRAPHITE.
Detroit Graphite Co.
Dixon Crucible Co., Jos.

GRATES—BOILER.
International Eng. Works.
Lombard Fdy. & Mch. Co.
Walsh & Weidner Boiler Co.

GRATES—MECHANICAL.
(See Stokers.)

GREASE.
(See Lubricants.)

GRAVEL AND SLAG ROOFING.
Murphy's Sons, C. P.

GREASE CUPS.
(See Lubricators.)

GRINDER—CARD, CYLINDER ROLL, NAPPER AND GARNET.
(See Card Grinding Machinery.)

GAUGES (WELDING).
Oxweld Acetylene Co.

GUARDS—ELECTRIC LAMP.
(See Electric Lamp Guards.)

GUARDS—MACHINE, SKYLIGHT, WINDOW, ETC.
Dowman, George.

GUIDES—THREAD.
Mitchell-Bissell Co.
Palmer Co., I. E.

GUMS.
(See Finishing and Sizing Materials.)

HACK AND BAND SAWS AND BLADES.
Racine Tool & Mch. Co.

HALFTONES—PRINTING.
Jacobs & Co.

HANGERS.
(See Shafting and Hangers.)

HANK CLOCKS.
(See Counters.)

HARDWARE—BUILDING.
Dowman, George.

HARNESS—LOOM.
(See Loom Harness.)

HARNESS TWINE.
Harris Co., Geo. W.

HEADS—BOBBIN AND SPOOL.
Lestershire Spool & Bobbin Co.
Parker Co., Walter L.
U S Bobbin & Shuttle Co.

HEATING AND VENTILATING APPARATUS.
(See Ventilating Apparatus.)

HEDDLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Howard Bros. Mfg. Co.
Reutlinger, J. J.
Steel Heddle Mfg. Co.
Walker Mfg. Co.
Williams Co., J. H.

HEDDLE FRAMES.
Crompton & Knowles Loom Works.
Gessner, David
Steel Heddle Mfg. Co.
Williams Co., J. H.

HOISTS.
Chisholm-Moore Mfg. Co.
Curtis Pneumatic Mchry. Co.
Elwell-Parker Electric Co.
Fulton Supply Co.
Link-Belt Company.
Louden Mchry. Co.
Morse Chain Co.

HOPPER FEEDERS.
(See Automatic Feeders.)

HORNS AND MUSICAL INSTRUMENTS.
Conn, Ltd., C. G.

HOSE (WELDING).
Oxweld Acetylene Co.

HOSIERY DYEING MACHINERY.
Cole Mfg. Co., R. D.
Franklin Process Co.
Philadelphia Drying Mchry. Co.

HOSIERY FORMS.
(See Drying Forms.)

HOSIERY YARNS.
(See Yarn Manufacturers.)

HOTELS.
Hotel Almac.
Hotel Martinique.

HOUSES AND MILL COTTAGES (READY BUILT).
Minter Homes Co.

HUMIDIFYING APPARATUS.
American Blower Co.
Carrier Eng. Corp.
Parks-Cramer Co.

HUMIDIFYING INDICATING INSTRUMENTS.
Foxboro Co., Inc., The.
Taylor Instrument Co.

HUMIDITY RECORDERS.
Foxboro Co., Inc., The.

HYDGRODEIKS.
Tayor Instrument Co.

HYGROMETERS.
Foxboro Co.
Taylor Instrumen' Co.

HYDRANTS (FIRE).
Murdock Mfg. & Supply Co.

HYDRAULIC TURBINES.
(See Turbines—Hydraulic.)

HYDRO EXTRACTORS.
(See Extractors.)

ILLUMINATING ENGINEERS.
Cooper Hewitt Electric Co.
Huntington & Guerry, Inc.
Panton, Harrison D.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Root Co.
Taylor Instrument Co.

INDIGO.
(See Dyestuffs and Chemicals.)

INDUSTRIAL SITES.
Atlanta Chamber of Commerce
A. & W. P. Ry.
Central of Ga. Ry.
Charlotte Chamber of Commerce
Georgia Rwy. & Power Co.
Georgia Railroad
Nashville Industrial Corp.
Seaboard Airline Ry.
Southern Ry.
Tennessee Electric Power Co.

INK—STENCIL AND MARKING.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

IRON AND STEEL.
Byerson & Son, Inc., Jos. T.

IRON WORK—ORNAMENTAL.
Cyclone Fence Co.
Dowman, George.
Dufur & Co.
Lombard Iron Works & Supply Co.
Piedmont Iron Works

JACK SPOOLS.
(See Spools.)

JACQUARDS.
Crompton & Knowles Loom Works.

JACQUARD HEDDLES.
Steel Heddle Mfg. Co.

JIGS.
Wicaco Screw & Mch. Wks., Inc.

JOINT COMPOUND.
Dixon Crucible Co.,, Jos.

JUTE BAGGING MACHINE.
Proctor & Schwartz, Inc.

KETTLES—SIZE.
(See Size Kettles.)

KETTLES—SODA.
Lombard Iron Works & Supply Co.

KIERS.
(See Bleaching Kiers.)

KNIT GOODS.
(See Cotton Cloth Commission Merchants and Dealers.)

KNIT GOODS WASHERS.
(See Washers—Cloth.)

KNITTING MACHINERY AND SUPPLIES.
Brinton Co., H.
Franklin Needle Co.
General Machine Works.
Granite State Needle Co.
Hemphill Mfg. Co.
Scott & Williams.
Shardlow, J. W.
Torrington Co.
Standard Trump Bros. Mch Co.
Wildman Mfg. Co.
Williams, Chauncey A.

KNITTING NEEDLES.
Franklin Needle Co.
Granite State Needle Co.
Williams, Chauncey A.

KNOTTERS.
Barber-Colman Co.
Mill Devices Co.

LABORATORY INSTRUMENTS.
Foxboro Co., Inc.
Root Co.
Taylor Instrument Co.

LACING—BELT.
(See Belt Lacing.)

LAMPS—INCANDESCENT AND ARC.
Carter Electric Co.
Cooper Hewitt Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

LAMP GUARDS—KEY LOCKING.
(See Electric Lamp Guards.)

LAMP REFLECTORS.
Carter Electric Co.
Cooper Hewitt Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

LANDSCAPE ARCHITECTS.
(See Village Architects.)

LAPPERS.
Saco-Lowell Shops.
Whitin Machine Works.

LATHES.
Fulton Supply Co.

LAUNDRY BAGS, BASKETS & NETS.
Smith Mfg. Co.

LAUNDRY MACHINERY.
American Laundry Mchry. Co.
Fletcher Works.
Gessner, David
Hunt Machine Co., Rodney.
Rome Machine & Fdry. Co.
Schaum & Uhlinger.
Tolhurst Machine Works.

LEAD BURNING APPARATUS (OXY-ACETYLENE AND OXY CITY GAS).
Oxweld Acetylene Co.

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(See Belting.)

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LEATHER SPECIALTIES.
American Supply Co.
Bond Co., Chas.
Graton & Knight Mfg. Co.
Jacobs Mfg. Co., E. H.
Williams & Sons, I. B.

LIGHTS—FLOOD.
(See Flood Lights.)

LIGHTING ENGINEERS AND CONTRACTORS.
(See Illuminating Engineers.)

LINEN YARNS.
(See Yarns—Linen.)

LINK BELTING.
(See Belting—Link.)

LINTERS.
(See Waste Dealers.)

LIQUID CHLORINE.
(See Chlorine.)

LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS AND CABINETS.
Allen Co.
Dowman, George.
Durabilt Steel Locker Co.
Mills Co.

LOGWOOD EXTRACT.
(See Dyestuffs and Chemicals.)

LOOMS.
Crompton & Knowles Loom Works.
Draper Corporation.
Fletcher Works.
Gessner, David
Hopedale Mfg. Co.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.

LOOM ATTACHMENTS—AUTOMATIC.
Draper Corporation.
Gessner, David
Hopedale Mfg. Co.

LOOM HARNESS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Wks.
Emmons Loom Harness Co.
Garland Mfg. Co.
Harris Co., Geo. W.
Steel Heddle Mfg. Co.
Walker Mfg. Co.

LOOPS (END).
Reutlinger Co., J. J.

LOOP PICKERS.
Jacobs Mfg. Co., E. H.

LUBRICANTS.
Dixon Crucible Co., Jos.
N. Y. & N. J. Lubricant Co.

LUBRICATORS.
Bowser & Co., S. F.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

LUG STRAPS.
(See Straps—Lug.)

LUG STICKS.
Allen Co.

LUMBER.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
(See Restaurant.)

MACHINE GUARDS.
(See Guards—Machine.)

MACHINE TOOLS.
(See Tools.)

MACHINISTS
Bird-Potts Co., Inc.
Briggs-Schaffner Co.
Cresson-Morris Co.
Lombard Fdry. & Mch. Wks.
Piedmont Iron Works.
Wicaco Screw & Mch. Wks., Inc.

MAILS (INSERTED STEEL).
Reutlinger, J. J.

MANIFOLDS.
Oxweld Acetylene Co.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MENDING EYES.
Harris Co., Geo. W.

MERCERIZED YARNS.
(See Yarn Manufacturers.)

MERCERIZERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.

MERCERIZED YARNS.
Aberfoyle Mfg. Co.
American Yarn & Pro. Co.
Boger & Crawford Co.
Dixie Mercerizing Co.
Hunter Mfg. & Comm. Co.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Gessner, David
Smith, Drum & Co.
Textile Finishing Machinery Co.

METAL CEILINGS, ETC.
Dowman, George.
Truscon Steel Co.

METAL CUTTING MACHINES.
Racine Tool & Mch. Co.

METAL SIDING.
Dowman, George.

METALS—PERFORATED.
(See Screens and Sieves.)

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
(See Counters.)

MILL BASKETS AND BOXES.
(See Boxes—Mill.)

MILL ENGINEER.
(See Architects and Engineers.)

MILL VILLAGES.
(See Villages.)

MILL SUPPLIES—MISCELLANEOUS.
(See Supplies—Mill.)

MILL WHITE PAINT.
(See Paint.)

MOPS.
Atlanta Brush Co.

MOTION PICTURES.
(See Theatre Equipment.)

MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
American Blower Co.
Carter Electric Co.
Fulton Supply Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

MOVING PICTURE MCH. AND SUPPLIES.
(See Theatre Equipment.)

MUSICAL INSTRUMENTS.
Conn, Ltd., C. G.

NAPPER ROLL GRINDING MACHINES.
(See Card Grinders.)

NAPPING MACHINERY.
Saco-Lowell Shops.

NAPPER CLOTHING.
Howard Bros. Mfg. Co.

NEEDLES—KNITTING.
Franklin Needle Co.
Granite State Needle Co.
Torrington Co.
Williams, Chauncey A.

OFFICE EQUIPMENT & SUPPLIES.
Atlanta Stamp & Stencil Wks.
Jacobs & Co.

OFFICE PARTITIONS.
(See Partitions.)

OIL—LUBRICATING.
Johnson & Co., Inc., Oliver.
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(See Engines Oil.)

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OIL CUPS.
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Bradley Mfg. Co., A. J.

OIL PUMPS.
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OIL SEPARATORS.
(See Separators.)

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Detroit Graphite Co.
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Hascall Paint Co.
Hockaday Co.
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Sonneborn Sons, Inc., L.
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(See Contractors.)

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(See Switchboards.)

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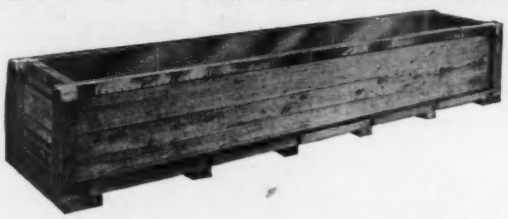

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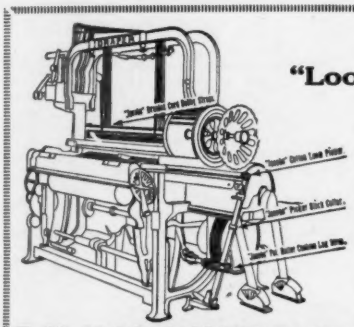

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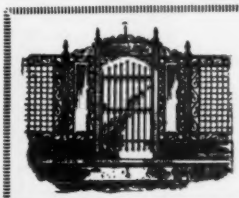

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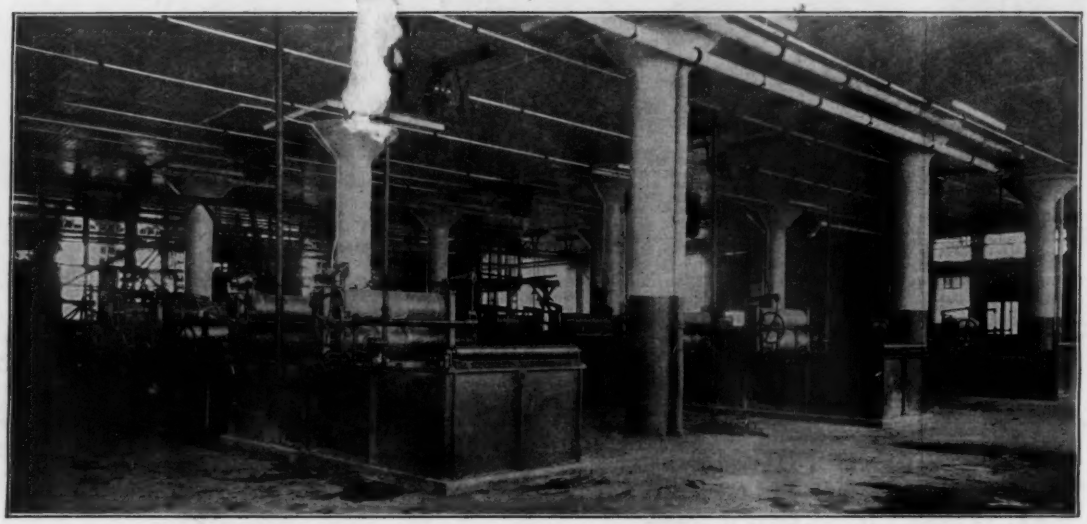

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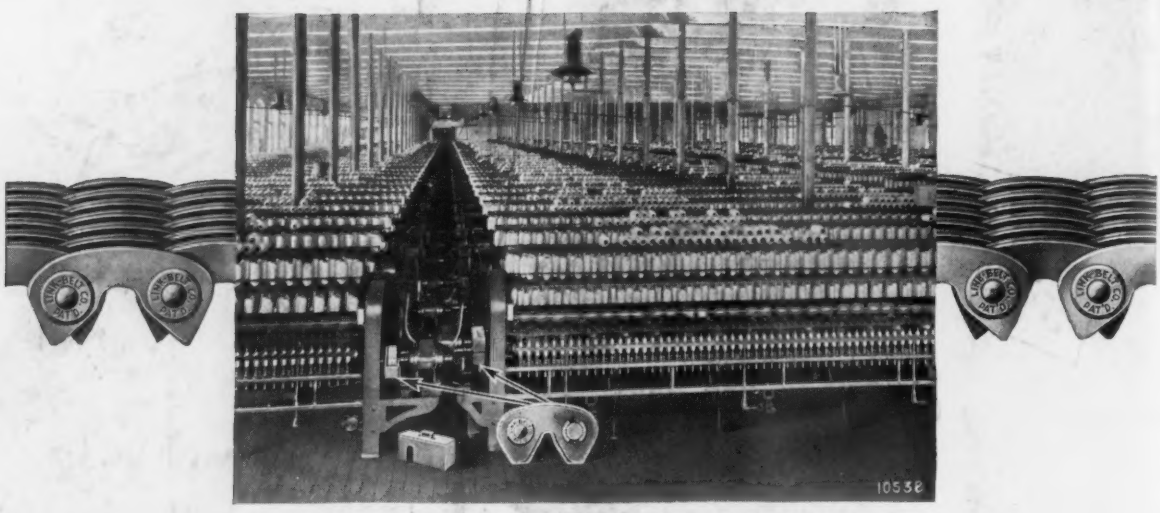

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